# ELECTRICAL REVIEW

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## Electric Light, Power, Telephone, Telegraph and Scientific Progress.

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### Dynamo Progress.

Describing some of the dynamos exhibited at Paris, our esteemed contemporary, London *Electrical Review*, says:

"The dynamos exhibited by Mons. Joseph Jaspar, of Liege, next claim our attention. Two types are shown, having respectfully four and two poles, as illustrated in Figs. 1 and 2. The machine, Fig. 1, gives at a speed of 700 revolutions per minute a current of 230 amperes at a difference of potentials of 70 volts. It is compound wound to supply current simultaneously for incandescent lamps and arc lamps in parallel. The octagonal yoke ring and radial magnets are of cast iron, all being in one piece. The armature ring is made of iron wire, and has a diameter outside of 376 mm. with an interior opening of 270 mm. Its length is 360 mm., and it is wound with 135 lbs. of insulated copper wire 4.2 mm. diameter, two wires being wound in parallel and the coils coupled up to a 120-part commutator. The current is collected by four sets of brushes. The resistance of the armature is .0085Ω hot. The cast iron magnets weigh 1,646 lbs. They have on their coils 93 lbs. of series wire five mm. diameter coupled eight wires in parallel, and 330 lbs. of shunt wire 3.1 mm. diameter. The series coils have a resistance hot of .0032 ohm, and the shunt coils a resistance hot of 5.75 ohms. The total weight of copper, as above, is 558 lbs., the total weight of the machine being 4,092 lbs. Its electrical efficiency is 92 per cent., the resistances being taken when the machine has attained its working temperature.

"The dynamo, Fig. 2, of the two-pole type, has also its magnets constructed of cast iron. This configuration is doubtless familiar to our readers, and the machine, though substantially made and a good specimen of its class, calls for no special description.

"Another exhibitor from Liege is Mons. H. Pieper. At his stand we noticed a dynamo of the single horse-shoe inverted form, with a Gramme wound armature. A sketch of the field magnets of this machine is given in Fig. 3, and it will be observed that the limbs, which are of circular section, spread out at the base instead of standing up parallel to each other. It is probable that the object in adopting this design is to insure that the lines of the field divide more equally between the two halves of the ring armature than they do when the magnet limbs stand parallel to each other. By its adoption the magnetic circuit is somewhat lengthened, though not to the extent observable in machines in which the magnet limbs lie in line opposite each other, and are connected with a split yoke, as in Fig. 4 of our first article (page 37). In these latter we have a perfectly symmetrical field, but with a long magnetic circuit and a necessarily heavy yoke. The present type may, therefore, be regarded as a compromise in which the induction circuit is not so long nor the frame so heavy, but where, on the other hand, the field is less symmetrical, though more symmetrical than in machines of the single magnet type, with a still shorter circuit and less weighty magnets.

"Several machines of the four-pole disc type, designed by Mons. Julien Dulait, are exhibited by the Compagnie Electricité-Hydraulique, of Charleroy, Belgium. These closely resemble the Victoria machine, as made some years ago, with narrow pole pieces. The commutator segments are cross connected, and the current collected by two brushes 90° apart. Some of these machines are combined with vertical steam engines, being mounted on a platform above the flywheel and driven by a short belt which passes over guide pulleys, placed on each side of the machine pulley."

### An English Electric Road.

An electric railway is now running in England in the southern coast, in which the supply system is quite different from an electric railroad in this country. About a foot and a half from the car on the side of the track, a flat rail runs, this rail being raised on posts of a foot in height, the current travels on this rail

FIG. 2.
ANOTHER FORM OF THE JASPER MACHINE.

being connected with the car mechanism by a rod containing a wire. A peculiar part of the system is in the crossing of streets, the rail ceases abruptly on one side of the road and the car, propelled by its momentum, plys across the road where the connecting rod catches on to the rail once more. A wire passes under the road from one end of the raised rail to the other side of the road and joins the current. These cars often travel at the rate of 20 miles per hour. The electricity used is generated by a water wheel at one end of the route.

### Electricity on the St. Lawrence.

A novel use of the electric light is made on the St. Lawrence River, near the Thousand Island resorts. The steamer "St. Lawrence" has a dynamo on board and one of the lights which it supplies with current is placed at the end of a yard arm in front of a powerful reflector. As the boat threads her way among the islands at night, the brilliant light is thrown down upon them,

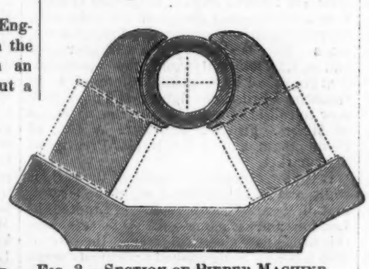

FIG. 3.—SECTION OF PIEPER MACHINE.

and their wonderful beauty, heightened and idealized, is revealed with startling distinctness. Another application of the search light, which can never be forgotten by those who have witnessed it, is that effected on the Mississippi steamboats on their night trips. A solid looking beam of electric light is projected far ahead, first on one bank and then on the other, and regularly feels the way for the boat's advance like a gigantic finger.

* * It is stated that the Electric Car Company of America, composed largely of Philadelphia capitalists associated with street railway enterprises, has transferred to the Thomson-Houston Company all its rights, title and interest to electric car propulsion by either the overhead or underground wires, and will hereafter work in harmony with the Thomson-Houston Company. The contract carries with it the assignment to the Thomson-Houston Company of the patents and inventions of Rudolph M. Hunter, Condict and others controlled by the Electric Car Co.

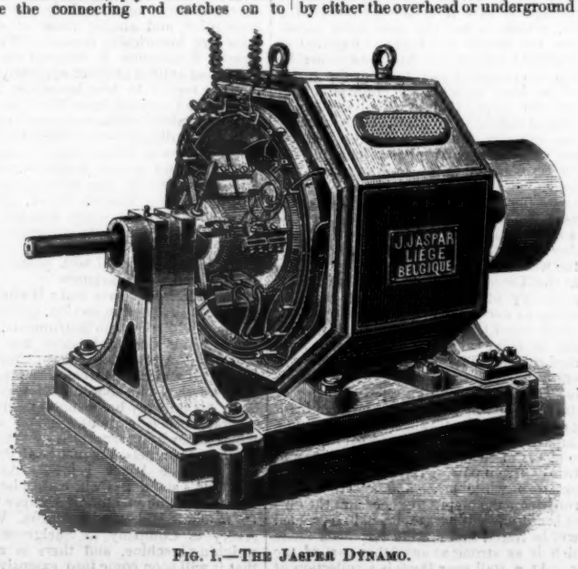


FIG. 1.—THE JASPER DYNAMO.

## The Birmingham, Eng., Exhibition.

A GREAT SHOWING OF THE ELECTRICAL WORK OF ENGLAND.

A NUMBER OF AMERICAN COMPANIES STRONGLY REPRESENTED.

A COMPLETE DESCRIPTION BY OUR REGULAR EUROPEAN CORRESPONDENT.

There is no doubt now of the success of the Birmingham International, Industrial and Electrical Exhibition, which was opened to the public at Bingley Hall, Broad street, on the 1st August by Lady Randolph Churchill, who owes her popularity not merely to the high talents of her very distinguished husband, but who has obtained for herself a high place in the hearts of the people by her own good gifts of courtesy and general kindliness. In choosing Lady Randolph to declare the Exhibition open, a decided compliment has been paid to the country to which she owes her birth, but to which, at the same time, it is freely admitted electrical science owes more than to any other for fruitfulness in inventions and in designs.

The Exhibition owes its origin to Messrs. Fowler and Lancaster, the well-known electrical engineers of Albert Works, Birmingham, who, recognizing how difficult a matter it is to take up with anything new and the principles of which they do not quite understand, were led to consider the best means to bring prominently before the people of Birmingham, and its district, the decided advantages electricity possesses, its possibilities by showing what has been done elsewhere, and the rich probabilities of obtaining similar beneficial results for themselves, and to their thought on the subject and their deliberations with other electricians, the present Exhibition acknowledges its birth.

It must not however be supposed that Birmingham has up to the present shown nothing of the advantages of electricity, for as a fact, together with Sheffield, this town has been the chief center of electro-plating and electro-metallurgy, both of which departments of the science have obtained that popularity which necessarily attaches itself to anything which adds to the comfort of our feeding. As to electric lighting, however, or the use of electricity as a motive power, Birmingham has done but little, and it is to be hoped that the result of this Exhibition may be to stimulate and to urge to the better understanding and employment of a science which is gradually but by most sure, certain and perceptible steps revolutionizing the world.

The building where the Exhibition is held, Bingley Hall, is capable of holding from 20,000 to 25,000 people, and while there are the usual stalls and exhibits one finds that much has been done to amuse as well as to instruct the visitors. In the hall itself is a large organ, electricity of course being made use of as a motor on which there are frequent recitals, and there is also a band in attendance and concerts every evening. The Winter Gardens are laid out with grottoes and fountains, and here one finds certainly not the least popular portion of the Exhibition

in the refreshment stall. Round the gallery of the gardens runs the overhead telpher line, which has been put up by the United Electrical Engineering Company, of Prince's Mansions, Westminster, and which is sure to be one of the chief amusements to the multitude. Another most popular representation near the main entrance is that of a coal mine with miner's cage and all other accessories. This has been carried out under the supervision of Mr. Foggs, the principal engineer to the Earl of Shrewsbury, who has kindly lent all the materials. The manner of producing the sensation of an actual descent is most ingenious. On entering the cage one goes down a short distance, while a Blackman air propeller creates a strong upward draught, and even though the cage is almost stopped, the walls, which are painted, being drawn up, the impression conveyed is one of continued and rapid descent, and when one has to alight it is difficult to believe you are not in the bowels of the earth. The illusion is completed when everything is found arranged at the bottom exactly as would be the case in a real mine. The cage is worked by one of Crompton's & Co's. motors, by worm gearing and shafting.

Another highly popular feature is an American hunting scene, with cardboard ducks, rabbits, etc., fixed on endless revolving bands, appearing to swim and run in different directions, and making splendid moving marks. The rollers are worked by a small Immisch motor.

As may be easily understood the bazaar element is very strong, but certainly the best portion of the Exhibition has been devoted to electricity.

The Executive Council have divided the electrical exhibits into three sections, the first comprising—dynamos, motors, alternating current transformers, accumulators, primary batteries, arc and incandescent lamps, insulated cables and wires, switchboards, meters and measuring instruments, automatic apparatus, switches, connectors, carbons, electroliers and fittings generally.

The second section shows electric lighting on every known system and also the various systems for the transmission of power by electricity.

Section the third has telegraph and telephone apparatus, phonographs, electric bells and clocks, electric welding and smelting, electrotyping and deposition, telpherage and electric machinery of all kinds.

For the electric lighting of the building, the principal part is done by Messrs. Fowler, Lancaster & Co., by means of Thomson-Houston dynamos and arc lamps. The steam power is supplied to the various engines by two Lancashire boilers, of Messrs. Galloway's, Limited, which have been erected in a shed just outside the engine room. The boilers are double flued, 18 feet in length, and six feet in diameter, a novelty being that the two flues converge and do not continue separated to the whole length of the boiler. They work up to 300 h. p. at a pressure of 100 lbs. of steam to the square inch.

There are five principal engines in a separate large room to the right of the main building, three being compound. Messrs. Ruston, Proctor & Co., of Lincoln, have a compound fixed engine, 30 h. p., and the fly-wheel is very heavy, with 120 revolutions per minute. Messrs. Robey & Co., of Lincoln, have two engines for exhibition and to help in driving the necessary dynamos. Both are compound horizontal, but the larger is their improved compound fixed type, and intended for use where large power is required and the space but limited. Mr. A. A. Goldston, of Middleborough, shows a Robey engine of the high pressure high speed type which drives a seven light Brush arc dynamo. It is capable of feeding 25 ordinary arc lamps. Another of the principal engines is an Armington & Sims high speed engine of 80 h. p., which has been manufactured by Messrs. Greenwood & Battey, of Albion Works, Leeds, and which drives two large Thomson-Houston dynamos, lighting 35 arc lamps each. Messrs. Crossley Bros. (Limited), show one of their Otto gas engines, nine h. p., nominal and horizontal type, which drives two Elwell-Parker dynamos, and which are employed to charge a set of accumulators running about 140 lights.

Among the dynamos is a large specimen of Messrs. Crompton & Co's. "Trade," made of cast iron and plated—the brushes being of stencil copper. It is compound wound, and gives 225 amperes at 110 volts, with a speed of 550 revolutions. Another dynamo is one of Messrs. Ernest Scott & Company's, which has not been before exhibited. It is a four-pole machine with projecting pieces enclosing a disc armature, as in the "Gülcher" machine, and without doubt has its origin in the addition to the firm of Messrs. Scott & Company's of Mr. W. C. Mountain, of the Gülcher Company. It has been constructed for 250 sixteen candle-power lamps and runs 65 volts for 850 revolutions, giving in present working 180 amperes. It supplies six 3,000 candle-power arc lamps as well as a five horse-power motor, and is run by Leviathan belting of Hebbethwaite Brothers, of Huddersfield, of which the engineer speaks in the very highest terms.

The Thomson-Houston apparatus exhibit is shown by Messrs. Laing, Wharton and Down, of 82a New Bond street, London, who are the sole agents for this country. The arc lighting of the Thomson-Houston system was first introduced into England at the London Inventions' Exhibition, 1885, where it obtained the only gold medal in its class, and it also took the only gold medal for electric lighting at Edinburgh Exhibition in 1886. In 1887 it was chosen for the complete lighting of the American Exhibition, for the Italian last year and the Spanish Exhibition now in progress at West Brompton.

An 18-light dynamo is shown at this exhibit and there are two more of 35 lamps each in operation in the engine room, being driven by a high speed engine of Messrs. Armington & Sims, and which gives a constant current of 10 amperes. There is also shown a 300-light alternator for incandescent lighting, and also a new converter and a low tension dynamo capable of supplying a venty-five 20 candle-power lamps.

Messrs. Lawrence, Paris & Scott show two compact dynamos, and Messrs. Elwell-Parker have also a couple of their widely celebrated machines on view and which are driven by the Crossley Otto gas engine before referred to, and have an output of 3,000 and 5,000 watts respectively and charge a set of accumulators running about 150 lights. The Anglo-American Brush Electric Light Corporation (Ld.), London, have a 35 kilo-watt Mordey alternator, which is driven by a Raworth vertical engine, supplying at 2,000 volts a transformer circuit of 100 volts with alternating current arc lamps taking 11.5 amperes. Here is also a 24 kilo-watt alternator and an E2 Victoria dynamo for 400 incandescent lamps. I have spoken before of A. A. Goldston's Brush arc lighter, and have only now to call brief attention to the dynamos of Messrs. Fowler, Lancaster & Co., of Birmingham, and of Mr. Napier Prentice of Stowmarket.

It is now necessary to speak of the various stalls, and I will tell first of one of the largest, that of Messrs. Crompton & Co., Limited, of London and Chelmsford. One sees here this firm's new electrical crane, the use of which is now being pushed with great energy and which has filled a long known want. In large timber yards or any trade where there is any great risk of fire, the use of steam cranes has become almost an impossibility, and timber has hitherto had to be carried by manual labor, and at the very serious expense of about 12 per cent. on the vlaue of the timber. To obviate these disadvantages Messrs. Crompton built a few months since an electrical crane similar to the one shown here for Messrs. Hermann & Co. to use in their furniture factory at Dodd street, Limehouse, London. It was guaranteed to raise 15 cwt., as a maximum load, or to raise 10 cwt., at a speed of 80 ft. per minute, travelling at a speed of 80 feet in the same interval. It was further specified that the gearing should be so arranged that it would be impossible to hoist and slue and travel and slue simultaneously; but it was not necessary to hoist, travel and slue at the same time. After several months trial the crane has given the highest satisfaction to the Messrs. Hermann. In addition to immunity from risk from fire, a most important advantage is that it is always ready for work, which is not the case with steam cranes, for should the latter be required at intermittent periods, the fire must either be drawn and relighted each time, or the steam must be kept up when the crane is not required for work, thereby involving much additional expense. With the electric crane, on the contrary, work can be done at all times without special preparations, as the generator is belted to the main engine of the factory, and is, therefore, kept running during working hours. The dynamo used by Messrs. Hermann supplies also the current to some incandescent lamps fixed in the timber drying store, offices and other parts of the works.

At the Thomson-Houston stall one has an opportunity of seeing an electric welding machine to carry out the system introduced by Professor Elihu Thomson, and which we learn is being very largely used in the United States. The machines are shown in operation several times each day, the process being effected by clamping the two pieces of metal in solid copper clamps and then turning on the machine through a switch. The clamps are then brought together until the two pieces of metal to be welded touch, and a strong current passing through very quickly raises to a white heat, and a screw being turned jams the metals together and the current is cut off. When the metal has cooled it will be found that a weld has been made which is as strong as any other part of the bar. At a stall near there is a collection of various metals which have been welded in the form of rings, tubes, bars, etc. In regard to electric traction, the company show a number of interesting photographs of some of the chief lines operated by their system, notably Dayton, Ohio, and other places in America.

A most interesting exhibit to those who claim for Birmingham that it was the introducer of electro-plating, is that of Birmingham Corporation, who show a magneto machine presented to them by the makers, Messrs. Prime & Sons, and dated 1844. It was constructed upon Faraday's experiments and was honored by a special visit from him; it is claimed to be the forerunner of the present dynamo and the first machine ever made for depositing gold, silver or copper.

Messrs. Tullis & Company, of Glasgow and Birmingham, show link belting, and in addition to Messrs. Hibbethwaite Brothers, to whom attention has previously been called. Belting is supplied to the various engines and exhibited by the Rosendale Belting Company and by Messrs. Binney & Son, of Birmingham.

Messrs. Coad & Company, of Soho Square, London, show domestic and miners' lamps with primary batteries. The contact is made by compressed air, and in case of accident the circuit is broken by the air escaping. Messrs. John Davis & Son, of Derby, show mining apparatus and other instruments. Mr. Julius Sax, of Ridgemont street, W. C., has a number of ingenious appliances for fire calls, as used by the Metropolitan fire brigade, electric clocks, billiard markers, etc., and also an electric call for carriages and cabs, with ivory indicators showing "left," "right," "stop," etc., to be fitted with a call bell close to the driver's side. A fire occurred in the Exhibition last week and its prompt extinction was due to the quick attention called by Mr. Sase's alarms. Various cables are shown by Messrs. Callender, Messrs. Walter T. Glover, Henley's Works Company, and by Messrs. Fowler & Co., who show the Yatham high insulation cables for which they are the agents. Messrs. Appleton, Burbey & Williamson have a varied collection of their fittings, china switches, lamp holders, etc., many of them ornamented in a very handsome manner. This firm manufacture also linings for battery boxes of a perfectly acid proof material, and which being extremely light are most useful for portable ship lighting, launches, tramways and other purposes. Messrs. Binswanger & Co., now better known as the General Electric Company of London and Manchester, have a stand with a number of switches and electric fittings as well as arc lamps and globes. Sir David Solomons exhibits the apparatus he has adopted for years for automatically regulating accumulators. The apparatus is self contained and constructed to regulate 250 to to 300 lamps of 16 c. p. in a 100 volt circuit.

The Electrical Power Storage Company, Ld., exhibit specimens of secondary batteries for central station and general lighting work. Messrs. Immisch various electric motors for launches, etc. There are good photographs of some of their launches and of a new three-wheeled dogcart, the front wheel of which is used for steering. One of the best exhibits is that of the Edison-Swan Company, where one finds incandescent lamps of all sorts and sizes. The chief novelty is a lamp for lanterns, etc., in which the filament of a 50 candle-power is curled into a flat spiral, and a very compact and powerful light produced. The idea, we learn, is one of Dr. Fleming's. Messrs. Woodhouse & Rawson, Ld., of Queen Victoria street, London, have a large number of electrical instruments and fittings of every description, and among those of old type some are historically famous. We believe Messrs. Woodhouse & Rawson are contemplating an exhibit of other apparatus also.

With regard to telephones, the National Telephone Company have fitted up a handsomely furnished room as a central exchange, with a long distance connection to Bradford and other towns, from whence concerts can be heard, and which, doubtless, will make this exhibit one of the most interesting in the building. Messrs. Buller, Jobson & Company, of Queen street, London, have an exact reproduction of the structures seen in towns, being a telephone wire on the roofs of two houses, and fitted with poles and wire and covered with insulators.

The Admiralty have lent a Whitehead torpedo complete and in section, and specimens of their field telegraph instruments. Planet Engineering Company show the working of their "Alpha" arc lamp, Macguaire's patent, in which the mechanism is controlled by a small electro-motor. Messrs. Ernest Scott & Company have another exhibit with several launch engines, and a separator where, after being separated by the action of revolving magnets, the material drops into two separate boxes below. At Messrs. Mayfield's stand is their eight-plate Wimshurst induction machine. Another very useful machine is shown by Messrs. W. & T. Avery & Company in Snelgrove's patent weighing machine, and there is no doubt that it will soon come into extensive use, as also Snelgrove's slow striking electric bell, for use in offices and houses, and which is immensely superior to the ordinary electric bell. The Acme Works Company show several examples of Cockburn's cut-outs and switches. They have also a small Boyce dynamo, which is driven by a Dicks, Kerr & Company's "Griffin" gas engine on the next stand, and also a new high tension locking switch, making 8 inch break. Messrs. Ayrton & Perry show ammeters, and have also a collection of fancy colored glasses suitable for electric light and which is most tastefully arranged. Messrs Shippey Bros. & Co., limited, show "C. & C." motors at work, and will also exhibit the Woodward storage battery, for which they are the agents. Messrs. Fowler, Lancaster & Co. have a large stand devoted to fittings and consisting of electroliers and brackets, china switches, roses and lamp sockets, of which they have made a specialty.

One can see, also, various processes of manufacture, in which the power is supplied by electricity. Messrs. Turner & Co., of the "Globe" pen; Mr. James Upton, of the Baskerville Printing Works, who has a "Fleet" machine, printing 1,800 copies in the hour; Mr. A. W. Abrahams, of Edgbaston street, Birmingham, who uses a one-half h. p. Elwell-Parker motor, and applies electricity to the manufacture of his pipes and many others.

Electro-plating and deposition is shown by Messrs. W. Canning & Co., of Great Hampton street, with Hemming's dynamo. Messrs. Hartler & Co., of St. Paul's square, and Messrs. Cruikshank & Co., of Camden street, all of whom are Birmingham firms.

Of exhibits not electrical and which, as the electrical exhibits are scattered through the buildings and in many cases most difficult to discover, one cannot help noticing in passing, mention may be made of the Lucigen light for use in night work contracts and from ordinary oil; the Automatic Standard Screw Co., of Halifax, who have many handsome examples of machine screw cutting for binding posts, etc.; Messrs. M. Turnor & Co., who show the manufacture of their globe pointed pens, and Messrs. George Richards & Co., Broadheath, Manchester, who have foot power stamping machines and also T-shaped head pulleys, which, being riveted across inner face of the rim, give a large surface for the transmission of driving power to the center.

In concluding this article I have to mention another stall, No. 129, which has been taken by *Electrical Plant*, the popular electrical monthly issued by Messrs. Wheatley, Kirk, Price & Goulty, of 52 Queen Victoria street, London, where visitors and exhibitors are sure of a courteous and a kindly reception, and a helping hand in any difficulty. To their Mr. F. B. Lea, in particular, I am greatly beholden, and would take this opportunity of thanking him and through him the firm he so ably represents. The special exhibition supplements which *Electrical Plant* are issuing, and the first of which is now before me, is well worthy of praise and will form a pleasant and most useful memento to all concerned with the Birmingham Industrial and Electrical Exhibition of 1889. C. Fr.

Birmingham, Eng., Aug. 21, 1889.

## Submarine Torpedo Boats.

A French contemporary says, referring to the new submarine torpedo boat: "It is not of to day that search is made, a little in every country, for the solution of a problem which seems now as impossible to solve as that of the steering of balloons; it is of the submarine boats that I wish to speak. M. Goubet has just concluded a long series of experiments with a submarine boat of his invention. This boat has been spoken of for a long time. The numerous preceding abortive attempts had put people on their guard against submarine vessels. Successful attempts were valueless against this state of mind, until it became necessary to recognize the fact that a solution of the problem had been found when the 'Goubet,' that is the name of the vessel, had remained eight hours submerged with two men on board, who smoked, ate, and played at cards without the slightest inconvenience. How is this vessel constructed which so well merits its name of fish-boat? This secret, like others relating to national defence, is well kept. But whatever the mechanism and the system which works the 'Goubet,' the experiments which are being continued at Cherbourg prove that it is efficacious. The naval authorities have not such a tender feeling for inventors in general that it would have consented, if the invention had not appeared really practical and capable of rendering real service, to place at M. Goubet's disposal a basin at the port of Cherbourg, and also officers and sailors. The new boat was able, during the course of the experiments, to sink at command to variable depths, and to maintain a perfect equilibrium. The sinking of the 'Goubet' was brought about with the greatest regularity, without oscillation or shock, quickly or slowly, according to the orders transmitted through the telephone wire which communicated between the submarine boat and the pontoon. At the different depths the 'Goubet' was manœuvred at will, and behaved as much like a fish as possible."

## The Rochester and Charlotte Electric Railway.

The Rochester Electric Railway was opened for travel July 3d. The road extends from the Lake Avenue terminus of the Rochester City and Brighton Street Railway to Ontario Beach at Charlotte, N.Y., a distance of 4.7 miles, double track with the exception of three pieces aggregating 5,800 feet. The road-bed is substantially constructed, 45 pound steel rails being used and ties laid 15 inches between centers.

The maximum grade is four per cent., maximum curvature 20 degrees. The track crosses the Charlotte branch of the N. Y. C. & H. R. R. R. overhead on an iron truss bridge of 81.5 feet span, and crosses the R., W. & O. R. R. on a plate girder truss of 58 feet span. The rail joints are connected with copper wire riveted to the rails and soldered to the track wire extending the entire length of the road, thus ensuring a thorough and complete electrical connection for the return current, in addition to the rails, reducing the resistance to a minimum.

The overhead construction consists of No. 0 hard-drawn copper wire hung by insulators from iron arms six feet in length, supported from cast iron brackets attached to poles between the tracks at intervals of 125 feet.

The equipment, furnished by the John Stephenson Company, of New York, consists of eight motor cars and eight tow cars, each 18 feet in length, the motor cars being attached to Bemis trucks, each truck equipped with two Thomson-Houston motors of 15 horse-power each.

The power station is located near the center of the line and having convenient access to the N. Y. C. & H. R. R. R. for the delivery of fuel; a one story brick building, 50x83 feet, divided into two rooms for boiler and engine and dynamo room. The boiler room contains two water tubular boilers, 16 feet in length of 150 horse-power capacity, each furnished with auxiliary pump-feed water heater and Jarvis grate settings. The engine room contains two Woodbury automatic cut-off engines of 125 indicated horse-power each, the pulley wheels of which are 80 inches in diameter. To each engine is belted a 80 horse-power Thomson-Houston railway generator.

The whole equipment received a thorough test July 4th, when over 3,000 persons were carried on four motor cars, each with tow car attached, in less than eight hours. For the 29 days of July that the road was operated 64,313 passengers were carried. For the first ten days of August passengers carried numbered 30,351.

Under arrangements with the Rochester Street Railway, round trip tickets are sold for 25 cents. Local fares for Charlotte are three, five and ten cents. The road has reduced travel on the N. Y. C. & H. R. R. R. and the R., W. & O. R. R. between Rochester and Charlotte fully one-half, and is the most popular mode of travel between Rochester and Ontario Beach.

## A New Pocket Galvanometer.

Mr. Chas. Plumb, of Buffalo, is the inventor of a pocket galvanometer, which we illustrate in the REVIEW this week. This was first made by Mr. Plumb in November, 1887, and he has been using it with great success ever since. The outside dimensions of the case are as follows: 1¾ inches in diameter, and ⅝ inches thick. The case is in the form of a watch, and upon pressing the knob the cover springs open, similar to that of a hunting case watch. When the case is closed the needle is raised off of the pivot. There are four holes in the outside edge of the case, three of which are insulated. By placing the wires in the holes, 1 and 2, a copper band of no appreciable resistance is placed in circuit; in 2 and 3, a coil of one ohm is placed; in 3 and 4, a 50-ohm coil is placed in circuit. These coils can be arranged to suit.

NEW POCKET GALVANOMETER.

Mr. Plumb attended the Niagara Falls Electric Light Convention, and showed his galvanometer to a number of electrical workers, who expressed themselves pleased with its simplicity and effectiveness.

ROCHESTER AND CHARLOTTE ELECTRICAL RAILWAY.

**Kansas City, Mo.**— The Southwestern Construction Company. The capital stock is $25,000 divided into shares of $100 each. The incorporators are Joseph P. Chenault, William C. Gunn, Livingston E. Davison, Louis K. Hyde and Charles H. Hammett.

**New York, N. Y.** — The International Graphophone Company, of New York City, is incorporated with a capital of $5,000,000. The objects of the company are to manufacture, sell and use all inventions appertaining to the recording and reproduction of speech and musical or other sounds, to license others to do the same, and to acquire American and foreign patents for such inventions. The company will include the United States and all foreign countries in their operations, the States of New York and Connecticut being principally mentioned, with principal office in New York.

**Chicago, Ill.**—Railway Automatic Danger Signal Company, Chicago; to manufacture automatic danger signals for railways; capital, $150,000; incorporators, James W. Steele, Nelson C. Gridley and Daniel H. Fletcher.

**Ottawa, Ont.**—Letters patent of incorporation have been issued to Thos. McDonald, Toronto; John T. Hagar, Jas. T. McCall, Montreal; Robert Schott, Sheffield, Eng., and Richard Wilton, Montreal, under the name of the "Canada Galvanizing and Steel Roofing Company, with $50,000 capital, in shares of $100 each.

**Rockford, Ill.**—The Rockford Electric Manufacturing Company, of Rockford; for manufacturing and selling electrical and other machinery, apparatus and appliances, and furnishing electricity for all purposes; capital stock, $50,000; incorporators, George A. Mayo, C. F. Warner, H. W. Price, and Peter Sames.

**Kansas City, Mo.**—The Gate City Electric Company. The object of the association is the manufacture and sale of electrical apparatus and supplies. The capital stock is $10,000, half of which is paid up, divided into 100 shares of the par value of $100 each, of which John W. Mason holds 98 shares, and Ward L. Gallagher and Thomas R. Cone one share each.

**Wausau, Wis.**—The Wausau Electric Company; capital, $40,000; incorporators, J. M. Smith, C. W. Harger, James Montgomery, W. F. Collins and C. J. Winton.

**Newark, N. J.**—The New Jersey Electrical Conduit Company have recorded articles of incorporation in the County Clerk's office. The incorporators are Elias A. Wilkinson, Gottfried Krueger, Cyrus C. Currier, P. Stanford Ross, James E. Flemming, of Newark, and Moses S. Hegbie, of South Orange. The place of business is Newark. The capital is $100,000.

**Sioux City, Ia.**—Articles of incorporation of the Sioux City Electric Railway Company have been filed with the Secretary of State; object, the construction and operation of a street railway in Sioux City. The capital stock is $1,000,000. The directors of the company are James E. Booge, John Hornick, F. C. Hills, Fred. T. Evans, Jr., William R. Smith and Zeno R. Brown.

**Madison, Wis.**—The Chicago, Milwaukee and Lake Superior Telegraph Company, of Milwaukee, has filed articles of association with the Secretary of State; capital stock, $100,000; incorporators, Charles L. Clason, Jeremiah Quinn and Edward A Benson. The Lane Manufacturing Company, of Kenosha, has filed amended articles increasing its capital stock to $75,000.

**Austin, Tex.**—The Citizens' Electric Light and Power Company, of Houston; capital, $100,000.

**Pittsburgh, Pa.**—The Sylvan Street Railway Company, with a capital of $24,000, has been chartered.

**Indianapolis, Ind.**—The Electric Street Railway Company filed its articles. The company will invest $8,000 in the enterprise.

**Taylorsville, Ill.**—The Taylorsville Electric Light Company; capital, $15,000. Incorporators, Clarence C. Travis, Robert E. Travis and Annie J. Travis.

**Bridgewater, Mass.**—An electric company has been chartered at Bridgewater, Mass., with a capital of $15,000. F. A. Wyman is president, and Arthur S. Palfrey, treasurer.

**Providence, R. I.**—At the organization meeting of the Warren Electric Light Company, John Waterman was elected chairman and B. M. Bosworth, clerk. It was voted to fix the amount of stock at $30,000, divided into shares of $50 each.

**Paola, Kans.**—The Paola Water and Light Company, to build water works and an electric light plant at Paola, Kans.; capital stock, $10,000; directors, J. W. Price, J. H. Phillips, C. H. Mallory, W. D. Greason and John C. Sheridan, all of Paola.

**Columbia, S. C.**—A charter has been issued to the Sumter Electric Light Company. The entire capital stock of $10,000 has been subscribed. The officers are: President, R. M. Wallace; vice-president, A. J. China; electrician, C. T. Mason, Jr.; secretary and treasurer, D. J. Auld.

**Albion, N. Y.**—The Albion Electric Light Company is formed by E. Kirke Hart, William G. Swan and George W. Barrell, of Albion, Orleans County. They propose to generate and supply electricity for power and illuminating purposes in the village of Albion, with a capital of $18,000.

**Pittsburgh, Pa.**—A charter has been issued to the Swissdale and Wilkinsburg Street Railway Company, with a capital stock of $33,000. It will be an electric road. The officers are: President, Joseph M. Wilson; directors, W. W. Murrey, Henry T. Rowley, David Moore and Robert Frazer.

**Milwaukee, Wis.**—A newly found company has been incorporated here, under the name of the Edison Electric Illuminating Company, of Milwaukee. The incorporators are Charles F. Ilsley, Charles Ray and D. M. Benjamin. The capital stock is $500,000, of which a large part has already been subscribed.

**Waterbury, Conn.**—The Connecticut Electric Company, at their annual meeting, held recently, elected the following officers: President, D. S. Plume; treasurer, E. T. Turner; secretary, A. M. Young. The board of directors are: D. S. Plume, E. T. Turner, A. M. Young, J. R. Smith, and C. M. Platt.

**San Francisco, Cal.**—The articles of incorporation of the Oakland and Berkeley Rapid Transit Company have been signed and the company organized, but the articles have not yet been filed. The capital stock is $250,000, in 2,500 shares of $100 each. The sum of $14,000 is actually subscribed. The object is stated to be to operate a railroad by cars propelled by electricity, or a cable road propelled by wire ropes. The directors are F. K. Shattuck, J. W. Coleman, A. J. Snyder, J. E. McElrath, James McGee, V. D. Moody, James Gamble, G. W. McNear, A. T. Eastland, Louis Gottshall. The president is F. K. Shattuck, and V. D. Moody, treasurer. It is the intention to use the overhead system of electric propulsion. The estimated length of the road as set forth in the articles is twelve miles.

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**CONTENTS.**


| | PAGE. |
|---|---|
| Dynamo Progress | 1 |
| An English Electric Road | 1 |
| Electricity on the St. Lawrence | 1 |
| The Birmingham, Eng., Exhibition | 1 |
| Submarine Torpedo Boats | 2 |
| The Rochester and Charlotte Electric Railway | 3 |
| A New Pocket Galvanometer | 3 |
| New Corporations | 3 |
| The Telephone and the Electric Railway | 4 |
| Begging the Question the Second Time | 4 |
| Electrical News: | |
| Our London Letter | 4 |
| Our Boston Letter | 5 |
| Our Washington Letter | 5 |
| Our Chicago Letter | 5 |
| An Open Letter to the Members of the National Electric Light Association | 5 |
| Personal | 5 |
| Telephone Undergrounding | 5 |
| Cost of Storage Battery Traction in Brussels and New York | 5 |
| Telephonic News | 6 |
| The Telephone Meeting at Minneapolis | 6 |
| Pacific Cable Enterprise | 6 |
| "Telegraphing in Battle" | 6 |
| Addition to the Phonograph | 6 |
| Electric Light for Convicts' Cells | 6 |
| Transmission and Distribution of Motive Power | 6 |
| Telegraphy Regarded from a Financial Point of View—High Speed and Low Speed | 7 |
| Telegraphic | 7 |
| Electric Power | 8 |
| The Snelgrove Electric Weighing Machine | 8 |
| Drop-Forged Commutator Bars | 9 |
| The Eickemeyer Dynamo and Motor Company, of Denver, Col | 9 |
| Electric Light as Beacons | 9 |
| Average Rate of Arc Lights | 9 |
| Electric Light News | 9 |
| Kindred Interests | 10 |
| Nervous Action and Electric Phenomenon | 10 |
| Carbon Setters' Strike Ended | 10 |
| Electrical Patents | 10 |


An inventor has patented an electric contribution-box for church use, says the Chicago *Herald*. Whenever a button or piece of tin is deposited in the box an electric bell rings and informs the congregation of the fact.

The paper to be read before the Telephone Convention entitled "A New Era in Telephoning," will undoubtedly be full of interest. Messrs. Angus Hibbard, J. J. Carty and F. A. Pickernell are the telephone athletes who unite in this effort, and the REVIEW expects to see a production full of value, interest and novelty.

The explanation of President Weeks, of the Electric Light Association, in the matter of the snubbing of Vice-President De Camp at Niagara Falls has not yet appeared. Instead of calling on Mr. De Camp, the president called to the chair the member (Mr. Morrison) who had raised the point of order, in deciding which in the affirmative the president provoked the appeal. If this is according to the president's friend Cushing, it must be in the revised edition of his Manual. Under the circumstances, Mr. Morrison was the one member who should not have been invited to the chair.

The suggestion in the REVIEW that the infant King of Spain start the machinery of the World's Fair, provokes the New York *Press* to say: "The King of Spain or any other king open the World's Fair? Not much." This is nonsense. It will not hurt this great Republic to honor the successor of Isabella and Ferdinand in this manner—in fact, in celebrating Columbus's work, it would be a peculiarly appropriate thing to do. The idea to be conveyed in the objection of the *Press* might have deserved recognition a century ago—to-day we are too big and great to think of such little things.

## *THE TELEPHONE AND THE ELECTRIC RAILWAY.*

A lively discussion of the electric railway problem may be expected at the Minneapolis Telephone Convention. The disturbance produced on telephone lines by the wires of the electric railway is one of the most unfortunate results of recent electrical progress. If either the telephone or the railway system should be provided with symmetrically placed return wires the trouble would be averted. To which system the return wires should be applied is a mooted question. The telephone companies being first in the field and representing large capital invested in plants, the economical operation of which is said to depend upon the use of an earth return, make the plea of vested rights, and contend that the electric railways should and can be constructed with a metallic return, in other words that the double trolley system should be used.

It is claimed on the other hand that the double trolley system is unreliable and only capable of limited application; that the telephone companies, quite independently of electric railway noises, are rapidly adopting the metallic circuit system on account of interference from their own wires and from those of the electric light companies; and furthermore that they have as much right to the earth as the telephone companies.

This controversy has come before the courts in different States and with various results. In some cases the railway companies were the victors and in others the reverse was the case.

We have not yet given up the hope that the single trolley system can be operated without detriment to existing telephone plants, and are strong in the belief that it only requires the proper combination of telephone and electric railway talent to bring this result about. Much of the time spent in unseemly wrangling at the Electric Light convention might better have been devoted to this important subject. A committee appointed to investigate this matter, acting under the auspices of the National Telephone Exchange Association, would be sure of a hearty co-operation from the railway interests who, with commendable zeal, are striving to amend their practices so as to produce a harmonious working of their systems.

## *BEGGING THE QUESTION THE SECOND TIME.*

President Weeks, of the National Electric Light Association, finds it necessary to write another explanation. The first half of his letter, besides being undignified, is a matter that the REVIEW and we think the members of the Association have little interest in. The mythical party attacked is, no doubt, abundantly able to take care of himself.

In his other statements Mr. Weeks essays deception, to speak mildly. He states that the report of the committee on the new constitution was accepted, and therefore adopted, on motion of "an associate member," and "was carried unanimously by a house two-thirds associate, and was immediately followed by a motion made and seconded by associate members," and therefore, as the associate members insisted on voting themselves out, notwithstanding his declaration that this could not be done legally, the charge against him of inconsistency "must fall."

Let us look at the official records and see if President Weeks speaks the truth.

Mr. Brown, of Chicago, moved to "accept" the report of the committee on revision of the constitution. Mr. Lynch, of New York, suggested that the "proposed constitution be taken up *seriatim* and discussed." Mr. Morrison, of Baltimore, announced as one in authority that Mr. Lynch's "motion is not in order. You first *accept the report*, and *then discuss* its provisions." President Weeks did not challenge this statement, but immediately put the vote. Had he been the honorable official that the REVIEW and all his other friends up to that moment had believed him to be, had he been worthy of the trust reposed in him, he would have promptly informed the convention that he intended to interpret the vote as he did, so entirely at variance with the understanding of every one who had spoken. The motion to accept prevailed, less than half a dozen persons voting, every one present except the mover and the would-be wily president very naturally believing the vote to be but a formal acceptance of the report prior to discussing the new constitution recommended in the report.

The author of the motion (not a whole army of clamorous associate members, as Mr. Weeks's over-artful letter endeavors to describe) then made another motion to appoint a committee on "rules of order," which gave President Weeks opportunity to make the astonishing announcement that the proposed constitution had just been adopted. Except the mover, and he may have been, every member on the floor of the Convention was taken by surprise. So far from this result being "unanimous," the new constitution received but *one* intended vote out of a membership of 250, and in a convention of between one and two hundred legal voters. And yet Mr. Weeks tries, in this communication, to convince these members of the Association, against their own senses, that this vote was unanimous and emphatic, and his narrow decisions consistent and just. One voter passing himself off as the whole convention and compelling the president to hasten to stultify himself makes a picture of so sensitive a soul that we can only drop a tear and move away in sadness.

There is some humor for all of us in President Weeks's statement, that the movement to get the Association to go to Kansas City did not "originate with him!" Perhaps we have another case of Dr. Jekyll and Mr. Hyde, and it was the Hyde-Weeks that made a speech at Pittsburgh favoring Kansas City (and at the same time presenting a plea for his own election as president), and it must have been the cunning Hyde who has deceived so many of us all along into the belief that President Weeks would deem it an honor to have the Association go to Kansas City, to say nothing of the bearing local influences might have on the question of his re-election. Of course Mr. Weeks never really desired the Association to go to Kansas City! The vote—19 to 11 against Kansas City—at Niagara Falls, and his manly rulings showed that it was forced on him by another of those "unanimous" votes!

The last paragraphs of this amusing letter indicates more of Hyde's work. To avoid "deciding against a personal friend" Mr. Weeks vacates the chair. There was nothing to "decide" at that time; it was only necessary to properly put the appeal from the illegal, inconsistent and unfair decision President Weeks had just made, and the proper man to do that was in all common sense not the one called to the chair. You state, Mr. Weeks, that you, sitting on the platform not more than 10 feet from the chairman, "could not hear the *conversation* between the chairman and the secretary." What a case for an ear doctor! And then you term the proceedings so faithfully chronicled by the stenographer down on the floor "conversation," and no doubt expect every reader to picture these two officials in a rear corner of the platform with loving heads close together softly whispering instead of speaking in the sonorous tones that both are in the habit of using when speaking to a convention, and which on this occasion were heard in every part of the hall.

Please don't ask us to believe that Morrison's lungs are affected, or that Secretary Garratt is tongue-tied.

The silly excuse for not calling the convention together Thursday afternoon will bring a smile to the face of every one who heard Mr. Weeks, after the "abrupt adjournment," mildly suggest it to the member from Baltimore.

The thing that damns the letter-writer from Kansas City is the official record of his actions, and his attempted bluff that on this he is willing to rest his case will only excite the contempt or commiseration of everyone cognizant of the facts.

There are some statements in this communication too ridiculous for serious consideration. We sincerely regret the humiliating position President Weeks occupies today in the sight of every fair minded man, and this condition has been brought about by his own o'er leaping ambition, weakness and inability to correctly write of actual and known occurrences.

Our great hope is that the Association will not be made to suffer. But there must be some intelligent and quick work done to counteract the colossal blunders committed at Niagara Falls.

# ELECTRICAL NEWS.

**Boston, Chicago, London and Other Points.**

## OUR LONDON LETTER.

The present time is the London holiday season, and there is in consequence very little being done in the electrical field in the way of new undertakings. The exhibition at Birmingham, however, does a great deal towards keeping matters alive, and people are beginning to look forward to the approaching electrical exhibition at Edinburgh.

The electrical trades section of the London Chamber of Commerce have had sufficient justification and reward for their appointment of Mr. Trotter to the post of correspondent in the amount of useful work which has passed through the hands of the committee since he took the business in hand.

Messrs. Strode & Company have opened a West End branch in Piccadilly, and show in operation an electric light installation with two horse-power gas engine, dynamo and battery giving current to 50 lamps, which are fitted to electroliers, roses, brackets, etc., and will do much to induce those who at present are prevented only from inability to judge of effect to make use of the light, education, luxury and comfort.

The provisional orders which were granted for South London for electric lighting have been permitted to fall through, and it is most difficult to understand for what reason. Everyone acknowledges, however, that it is only a matter of time. With regard to the other London lighting orders the Select Committee of the House of Lords, presided over by the Earl of Limerick, and which was appointed to inquire into the bills granted by the Board of Trade and confirmed by the House of Commons, has now passed all with the exception of Westminster.

The title of the electrical exhibition which is to take place early in next year in Edinburgh is "The International Exhibition of Electrical Engineering, General Inventions and Industries, 1890." The secretary is Mr. George E. Watson, C.A., and an agreement has been entered into with Mr. Lee Bapty, of the Manchester International Exhibition, to act as general manager. The guarantee fund is now believed to have reached upwards of £10,000, and as the whole of Mr. Edison's exhibits will be shown, including those now at the Paris Exhibition, and as there will be a special section devoted to the application of electricity to medicine and surgery the Executive Council would appear to be justified in their prognostication of a great success. The site decided on is at Merchiston, where there is upwards of 50 acres available.

The newest departure in electricity, to which the greatest objection on the part of the multitude has hitherto been expense, has now been taken by the South Eastern Railway on which in the main line trains passengers can now obtain the use of a five-candle power electric light reading lamp for half an hour for the small outlay of 1*d*. At the completion of the period paid for by placing a coin in a slit in the usual way, the light is automatically extinguished, but the insertion of another coin of similar amount will continue the supply for any period desired. The apparatus is contained in a small base which is placed above the passenger's head, and there is one accumulator to each carriage by which all the lamps are supplied. A very decided improvement on other inventions of a similar kind is in the fact that should the apparatus through any cause be out of order, the proper coin being deposited—no result follows the insertion of one of a different size—it will fall through to the bottom of the box in such a way so that it can be recovered.

From a circular which has been issued to those members who have signified their intention of attending the Paris meeting of the Institution of Electrical Engineers, I learn that a joint meeting of the Institution and the Société Internationale des Electriciens will take place at the rooms of the Société, 44 Rue des Rennes, Place St. Germain des Près, on Friday, the 23d inst.; at which the members will be received by Col. Sebert, the president, who will inaugurate proceedings by an address of welcome. This is to be followed by addresses from Sir William Thomson, as president of the institution, and Monsieur Mascart, president of the Paris International Congress, 1889. Edison's improved phonograph and telephones in connection with the opera, and Carpentier's "melophone," will be exhibited among other instruments and apparatus. The chief works of interest in Paris will afterwards be visited, including the Eiffel Tower, Grand Opera, Central Electric Light Station at the Palais Royale, the Telephone Society's construction works, the Central Electrical Laboratory, and Messrs. Menier's cable works, etc. As 128 members, associates and students of the electrical engineers have promised to attend, the meeting should prove most successful.

Telephonic communication has now been established between Amsterdam and Rotter-

dam, via The Hague, and a branch will very soon be opened connecting with Scheveningen, the well-known watering place on the North Sea.

English electricians, and I may say the English people generally, are most eagerly looking forward to Mr. Edison's visit to this country. He is expected at the Birmingham Exhibition, this week, and his visit will greatly add to its popularity. Preparations have been made to give him a most enthusiastic reception. Mr. Edison has expressed himself as greatly delighted with the Eiffel tower, which he ascended to the highest point above the lighthouse, gaining a look out over a vast landscape. I am told that as an engineering feat, he declares that it is only a matter of time before our cousins at the other side of the Atlantic not merely rival, but outdo the Europeans with a similar structure.

Following in the steps of Messrs. Ruston, Proctor & Co., of Lincoln, and Messrs. Woodhouse & Rawson, of Queen Victoria street, London, the Fowler Waring Cables Co. has just been issued to the public. It has been formed to unite the electric cables business, carried on by John Fowler & Co., of Leeds, and Mr. Richard Waring, of 85 Queen street, London and Pittsburgh, Pa., U. S. A., who has worked the patents of Mr. James Tatham, of Philadelphia, U. S. A., and Mr. R. W. Eddison, of the Steam Plough Works, Leeds, as well as his own, for improvements in manufacture and insulation of metal covered electrical cables. The board of directors is a very strong one, including Mr. William Fowler, chairman, Col. J. T. North, of Nitrates fame, Walter Chamberlain and Messrs. Eddison & Waring, who join after allotment. As the second day the company was issued, the shares were passing from hand to hand at one per cent. premium, there is no doubt of its being successfully floated and with such a board there is certain to be no lack of proper management, one is justified in expecting the Fowler Waring Cables Co., Limited, to be a most successful one. C. Fr.

London, Eng., August 20th, '89.

## OUR BOSTON LETTER.

**Bridgewater, Mass.**—The Bridgewater Electric Company has been incorporated, with a capital stock of $15,000. Ferdinand A. Wyman is president, and Arthur S. Palfrey, treasurer, and these, with Phœbus H. Alexander, constitute a majority of the directors.

**Peabody, Mass.**—The Robinson-Foster Electric Motor Company paid off its help on August 27th and shut down for two weeks. The works at South Peabody are now in possession of a keeper, placed there by F. W. Prescott, of Boston, who holds a chattel mortgage of $1,000 against the company. The property was to have been sold, but the auctioneer was stopped by an injunction made by the company at the last minute. It is expected that a settlement will be made.

**Clinton, Mass.**—The Wright Electrical Engineering Company, of this city, is engaged in making improvements and changes in the light station at Clinton, necessitated by the demand for incandescent lights. A 600 light Thomson-Houston alternator has been put in and the arc machines re-arranged and set on new stone piers. A new switchboard will replace the old and smaller one.

**Fire Department.**—The Boston fire department has been supplied with light ladders, about 25 feet long, with three legs like an easel. These are to be used in getting at the electric railway trolley and span wires in case of their interference at a fire. With one man to steady the ladder, another can run up and cut the wires very quickly. It is understood that the men will be provided with glass handled pliers for this purpose.

**New Tremont Theatre.**—The Edison Company have recently put in two new large-sized junction boxes at Tremont and Boylston streets, in order to supply current for the new theatre. Two entirely new lines had to be run and two others increased in capacity. The Edison Company is to wire the theatre and also supply electricity for light, heat and power. Work is to be commenced immediately, and all the electrical appointments are to be of the latest and most approved designs. The curtain is to be raised and lowered by means of motors, and some novel effects in stage lighting may be expected.

**Tests.**—The Thomson-Houston Co. are having a series of motor tests made at the Massachusetts Institute of Technology. Mr. Warner, '89, is in charge of the work which is not quite finished. The tests for efficiency have been made under purely electrical methods, and the results promise to be of considerable interest both to the company and their patrons. This company has just closed a contract with the Second Avenue Passenger Railway Co., of Pittsburgh, Pa., for an electric railway 10.06 miles long and equipped with 10 cars.

**Maine.**—The railroad commissioners of Maine are engaged in giving hearings to the railroads of the State on the subject of steam heating and lighting of passenger cars. Several systems of heating and lighting are being strongly advocated, but the commissioners will take no action until each system has been thoroughly examined and tested. S. L. C.

Boston, Sept. 2, 1889.

## OUR WASHINGTON LETTER.

**Trial of Electric Motor.**—Captain A. A. Thomas, president of the Brightwood R. R. Company, states that his company will not be ready for the trials of the electric motor on their system for about 10 days. He says that the specifications and drawings were sent on some time ago, but that the car will not be ready until late next week. He contemplates going East soon to supervise the construction of the car in person. They will use a specially constructed car by Stephenson, with such motor as may be suitable for the work in hand. There are numerous hills on the line, but in no case, so I am informed, does the grade exceed five per cent. There can be no doubt of the success of the undertaking. The road will run to one of those little suburban places that spring up in a day around all our American cities. Numbers of the business men of the city live out there, as well as clerks in the departments, and with such facilities for transportation, more removals to that delightful section will be in order. Travel from this source alone will be large. Another prolific source of revenue will be the numerous persons who take the trips out and back for the airing, as well as from a desire to witness the operation of the new apparatus. This class of travel will be enormous, especially on Sundays and holidays.

**More Motor.**—That "super-lively" paper, the *Evening Star*, of this city, has learned the value of the electric motor. Some time ago they had an accident by a falling wall, which damaged their engines so as to render them useless. They immediately telegraphed to your city for electric motors. Pending their arrival their sheet was printed on the press of the *National Tribune*. When they arrived and been set up work was resumed on their own presses. They are geared by belts and shafting in the usual manner, and run two large Hoe presses which deliver a daily edition of 25,000 copies. They also run fans to ventilate the press room. They appear to give entire satisfaction, and I would not be surprised were they retained permanently.

**And Now Come the Washington Gaslight Company** by their attorney W. B. Webb. The gas company has blown itself up with its own gas, in emulation of the frog in the fable, to its utmost capacity; and it only remains to see if its fate will be similar to that of the frog. In other words action has been begun to restrain the commissioners, and the Electric Heat and Power Co., of Pittsburgh, from fulfilling a contract for lighting the streets, entered into by these parties some time since. The gas company rely largely upon the fact that the contract has been made with them for gas light for the fiscal year. There is however a provision in the act which gives authority to substitute a material of less price than gas. This they meet by alleging that the commissioners have no right to select the electric light above all others, and denying in toto that the light will be furnished at less price than gas. Another strong point made is that the commissioners have no right to authorize the tearing up of the streets to build new lines, but only to permit the burial of existing wires. On the other hand, the respondents briefly allege that the clause of the act which relates to the erection of new lines, applies only to private corporations supplying individuals, and that the right to substitute other material than gas gives the right to do all that is essential to the supplying of the said substitute. The outcome of this matter is awaited with interest, as it is fraught with great importance. Should the gas company be successful it will throttle all attempts at better lights under existing laws, and deprive us of the relief that electricity alone can give. In view of these circumstances I am not sure that the Long Distance Telephone people are safe, if the court holds that the commissioners cannot authorize the erection of new lines. Should the issue go against it, the gas company will be doomed unless it can afford to reduce prices to such an extent that electricity can never expect to compete against it, which is extremely doubtful. More anon. G. E. M.

Washington, D. C., August 30th, '89.

## OUR CHICAGO LETTER.

**Electric Railway.**—At Ottawa, Ill., on the 19th, a banquet was given at the Clifton Hotel in honor of Mr. J. T. Evans, apropos of the unquestioned success of the Ottawa Electric Railway, of which Mr. Evans is president.

**Telephone Company in Court.**—The Wisconsin Telephone Company is defendant in a suit for $10,000 damages brought by Andrew Jackson, whose house was burned by lightning on the 20th at Eau Claire, Wis. The claim is that a telephone wire strung over the building attracted the lightning, and was thus the cause of the conflagration.

## An Open Letter to the Members of the National Electric Light Association.

I am not surprised that the electrical journal which has, for some time past, been conspicuous for its lagging pace, should have found my communication of the 16th inst. "so shallow" as to require further consideration before publication; but no one who prides himself upon his "journalistic manhood" should intentionally misquote.

It may not now be out of place to set before those who wish to form a correct judgment of the conduct of the association, a fact which will perhaps explain the animus of the recent personal attacks, and show that the attempt to use the association for personal ends did not come from your president.

Prior to the reception of the report of the committee on nominations and place of meeting, and after the names suggested for the next executive committee had become known, a member of the association having a grievance against one of the nominees, protested against his preferment, and *advised* me that unless his name was stricken from the list, the next convention would be held in St. Louis. I declined to interfere; answering that I saw no connection between the nomination of the gentleman in question and the place of meeting, and informing him that the whole matter was in the hands of the nominating committee, and must be passed upon by the association in convention. Confident that the large majority of our members do not favor moving the association through political wire workers, or prostituting it to personal gain or the punishment of personal enemies, I feel sure that had I chosen to take the floor and, by descending to personalities, sacrifice the feelings of a few, the first vote on the meeting place would have been different.

I am charged with inconsistency in that upon one day I said: "We certainly could not legislate members out of the association," and upon the next but one decided that the new constitution was adopted. I still maintain that central station men could not vote associate members out of the association. But when such movement originated with the associate members, when the motion to accept came from an associate member, when the motion was carried unanimously by a house at least two-thirds associate, and was immediately followed by a motion made and seconded by associate members to appoint a committee on by-laws, all charge of inconsistency must fall. Had the proportion of active and associate members been reversed, and had the motions above referred to come from active members and been carried by them notwithstanding the protests of associate members, the charge of inconsistency would be just.

I will pass the statement that I have used the association for my personal advantage, with the observation that the decision upon the adoption of the new constitution was first made upon a question foreign to the place of meeting, and that the movement to convene in Kansas City did not originate with me, nor can a convention there held in any way assist my private fortune, or those of the companies which I represent. We have no advertising or subscription lists to maintain, or chattels of any kind to sell. Mr. Rhodes, Mr. Gilbert, Mr. De Camp, Mr. Morrison or any of the purely central station men who have entertained the association, will doubtless testify that the balance is heavily against profit and loss.

My action in relinquishing the chair on appeal from my decision seems to have been generally misunderstood. While I might have retained it by parliamentary rule, I chose to follow custom, and at the same time avoid deciding against a personal friend. Knowing that the work of the convention was not completed, I expected to resume the chair after the decision upon the appeal. As I could not hear the conversation between the chairman and the secretary as to the next order of business, nor the motion to adjourn, no one could have been more surprised than I at the abrupt adjournment. Far from being indifferent, I refused to recognize it as *sine die*, until forced to do so by the record of the secretary, and by parliamentary law.

In conclusion, I would suggest that the interests of the Association cannot be furthered by personal attacks or by general charges unsustained by proof of record. My only desire is that the facts as shown by the secretary's minutes shall be the basis of judgment upon the work of the Niagara Convention.

Edwin R. Weeks, *President*.

Kansas City, Mo., August 28, 1889.

## PERSONAL.

Charles E. Carpenter, of Minneapolis, is the inventor of a new electric heat apparatus, chiefly intended for cooking. Advantages in the way of heat insulation are claimed.

Mr. Arthur Brisbane, the talented London correspondent of the *Sun*, has returned to New York and taken the editorship of the *Evening Sun*, and that wide-awake little journal already shows pronounced improvement.

Mr. C. J. H. Woodbury, of Boston, the well known electrical engineer and scientist, has returned from a very enjoyable visit to Europe. Mr. Woodbury was accompanied by his wife, and both greatly enjoyed the visit to the Paris Exposition and other interesting points.

Mr. H. M. Byllesby, vice-president and general manager of the Westinghouse Electric Company, Mr. W. L. McCullagh, auditor, Mr. Leonard E. Curtis and Mr. Oscar H. Baldwin comprise a strong electrical party that sailed for London on the "City of Paris," Wednesday of this week.

## Telephone Undergrounding.

The Chicago Co. is putting its wires under the surface in an entirely new system of conduits. This is a sectional tube of vitrified clay, with a longitudial partition running its entire length, forming two ducts. The sections are placed end to end, and thoroughly wrapped at the joints with cloth saturated with a water proof compound. The whole is then buried. At short intervals, opposite each lot in a block, a T section is put into the conduit, through which the necessary wires are carried to the area wall and thence along the area to the patron's telephone.

The conduit is 10x10 inches outside, and the compartments or ducts are 3½x 8 inches. Into each of these ducts three cables of 180 wires each are drawn. Manholes of sufficient dimensions for convenience of working are placed at intervals along the route, for for repairing, exchanging or other necessary work.

Just now the company is doing some very extensive work on Franklin street, north of Washington. An iron box, the full width of the window, runs from the second story of the building to the ground, terminating in a subway beneath the alley at the rear of the telephone building. This subway terminates at a huge manhole in the middle of Franklin street. From this point northward a trench seven feet deep is dug, and into this are laid two of the conduit pipes described, side by side, and above these others are placed until three pairs of conduits have been placed. These are for through wires. Above these again, a single conduit is placed, which is the distribution conduit, from which wires will be taken as above stated for patrons along the route.

The capacity of the entire collection of seven conduits, each having two ducts, is 3,250 double wires—or metallic circuits for that number of telephone lines.

When this system is completed—when the metallic circuit has become an assured fact—there will not be a more perfect, noiseless, rapid or, in every respect, cleaner telephone system on the face of the earth than that of Superintendent Wilson's in Chicago.

## Cost of Storage Battery Traction in Brussels and New York.

The Julien electric cars have now been in regular passenger service for a little over two years in Brussels, and a report has just been prepared of the cost of motive power during that time. The motive power includes the renewal of batteries, the wear and tear on motors and machinery, the generating and storing of the energy and repairs and replacements generally—in fact, every element that can be understood by an engineer to be motive power.

It has been found that the cost of motive power has been a trifle less than three cents per kilometer, or about five cents per car mile; in this, the cost of maintaining the batteries has amounted to 1⅛ cents per car mile.

It may be of interest to know that the estimate of the cost of motive power as based on the experience of the Julien Electric Traction Company on the Fourth and Madison avenues, New York, and prepared prior to the report at Brussels and without any knowledge of the cost there, is within a fraction of being the same. The Julien Company find the cost of motive power on Madison avenue to be 5.3 cents per car mile. In the cost of motive power as estimated in New York, however, was included interest on investment, amounting to 1.8 cents or 3.5 cents per car mile net, including depreciation on battery, cost of generating current and handling of batteries.

⁂ We are informed that the So. New England Telephone Company are putting their wires underground at New Haven, and will have the work completed by Dec. 1st.

⁂ The next meeting of the National Telephone Exchange Association will probably be held at Detroit, Mich. The invitation was extended a year ago. This is a delightful city for conventions.

⁂ The National Telephone Company and the Delaware, Lackawanna and Western Railway Company are engaged in a dispute about the location of poles of the former company, between Watsessing and Bloomfield stations.

⁂ A new trunk telephone wire will be at once put up between North Easton and Brocton, Mass. Hard drawn wire and 50-foot poles will be used. The wires to Boston from New Bedford, Providence and Fall River will follow this route and pass through Brockton.

⁂ A handsome souvenir will be presented to each passenger on board the "Telephone Limited" train to Minneapolis next week. The Penn. R. R. Co. intend to make this train the finest ever sent out, and the telephone people should warmly thank Secretary Barney for the success of his efforts in securing such excellent accommodations.

⁂ The first electric light in a dwelling house in the world is said to have been used in Salem, Mass., in a parlor which was lighted every evening during the month of July, 1859, by the electric light, and it was subdivided, two lamps being used, either of which could be lighted by turning a little button to the right. The current, says *Light and Heat*, was taken from a galvanic battery of about three dozen six-gallon jars. The electrical genius who thus accomplished so much and so far back in nineteenth century history was Mr. Moses G. Farmer, an eminent electrician, who is still alive, though in feeble health, at Elliott, Me.

⁂ The Chicago, Rock Island & Pacific and the Lake Shore & Michigan Southern Railway Companies secured an injunction from the circuit court restraining the Chicago Telephone Company from constructing, digging or extending its conduits across the right of way and under the tracks of the complainants on Harrison street, and from entering, obstructing, or in any way interfering with the companies' right of way on Harrison street, until it has established its right to do so by condemnation proceedings. The railroads filed a bill in which they say the telephone company is proceeding to disturb its right of way without allowing for an opportunity to ascertain the damages the railroads may suffer. The complainants gave an injunction bond of $3,000.

⁂ It has been pointed out recently that the development of power transmission in the United States has been mainly in the direction of distribution from a common source of energy to many small motors. Recent returns afford a basis for approximate estimate and there are to-day as many as 6,000 electric motors in use in the United States for industrial purposes. These have a capacity varying from the small one-sixteenth horse-power up to the 50 and 60 horse-power motors employed in mining and milling works. One of the most common and favorite sizes is 10 horse-power, of which large numbers are in use in New York, Boston, Baltimore, Rochester and other places. Every manufactory of electric motors in the United States is crowded to its utmost capacity in its efforts to meet the constantly increasing demands for electric power.

## THE TELEPHONE MEETING AT MINNEAPOLIS.

The eastern members of the National Telephone Exchange Association will leave here on a special train on the Pennsylvania road promptly at 9.15 A. M. Sunday, September 8th. The train will be known as the "Telephone Limited," and goes through to Minneapolis without change, carrying its own dining car.

The following are the present officers of the Association, the terms of all of whom, with the exception of the first two members of the advisory committee, will expire at the Minneapolis meeting: President, Henry Metzger, Pittsburgh, Pa.; vice-president, Wm. D. Sargent, Brooklyn, N. Y.; secretary, C. H. Barney, New York City; treasurer, H. L. Storke, New York City. Advisory committee, for three years, Morris F. Tyler, New Haven, Conn.; for two years, Edward J. Hall, Jr., New York City; for one year, H. N. Gifford, Louisville, Ky. Executive committee, Henry Metzger, *ex-officio*, Pittsburgh, Pa.; Geo. N. Stone, Cincinnati, O.; Samuel M. Bryan, Washington, D. C.; W. J. Denver, Boston, Mass.; U. F. Cutler, New York City.

Secretary Barney announces that the train will take on delegates at Philadelphia, Harrisburgh, Altoona and Pittsburgh, and arrive at Chicago about 9 A. M. on Monday, September 9th.

The forenoon will be spent in Chicago according to the individual inclinations of the members of the party, but all are invited to meet at 12 M. at the rooms of the Chicago Electric Club, where a lunch will be served, followed by a carriage drive around the city, and through its beautiful parks—the lunch and drive being tendered by the Central Union Telephone Company, and the Chicago Telephone Company.

The carriages will leave their occupants at the new Grand Central Passenger Station, corner Harrison street and Fifth avenue, in time for the start for Minneapolis, which will be made at 5.30 P. M., and the end of the journey will be reached at 8 A. M. on Tuesday, September 10th, the opening day of the convention.

The fare from New York to Minneapolis will be $38.50, which includes sleeping accommodations.

For the convenience of delegates from Chicago and vicinity, who may wish to join the party from that point on, an additional sleeper will be attached. Fare from Chicago to Minneapolis, $13.50, including berth. For information or tickets, early application should be made to C. D. Dunann, 204 South Clark street, Chicago.

The following communications relating to the Chicago entertainment are of interest, particularly to the New York visitors:

CHICAGO, Aug. 22, 1889.

GEN. C. H. BARNEY, *Secretary*,
510 West 23d street, New York City.

Dear Sir.—It is understood that your special train en route with delegates for the Minneapolis Telephone Convention will lay over in Chicago from 9 A.M. until 5.30 P.M., September 9th, and it affords us pleasure to tender to yourself and entire party, in behalf of the Chicago and Central Union Telephone Companies, an informal luncheon at the Electric Club rooms, 103 Adams street, promptly at 12 o'clock, noon, of that day, to be followed by a drive through some of our parks and boulevards (viewing the site and plans of buildings in process of construction for the World's Fair in 1892, etc.), carriages returning to your train by 5 o'clock, P. M.

Begging an acceptance, and hoping that we may be able to contribute somewhat to the pleasure and comfort of the party while here, we are, Yours very respectfully,

C. H. WILSON,
For Chicago Telephone Co.
F. G. BEACH,
For Central Union Telephone Co.

The secretary replied as follows, with true New York appreciation:

510 West 23d Street,
New York, August 27, 1889.

Messrs. C. H. Wilson and F. G. Beach, Chicago, Ill.

*Gentlemen*: Your favor of the 22d inst. is at hand, conveying invitation of your respective companies, to the telephone party en route for Minneapolis, to partake of a luncheon and participate in a carriage drive through your parks and boulevards, on Monday, September 9th, and it gives me pleasure in behalf of the members of the National Telephone Exchange Association, who will form the said party, to accept same, with thanks for your kind consideration.

As one of the inducements of the drive, you mention that we will be afforded a view of the site and plans of buildings, in process of construction, for the World's Fair in 1892. I am sure that such a view will be a *great surprise*, and of the utmost interest to the delegates from New York City.

Yours respectfully,
C. H. BARNEY, Sec'y.

### Pacific Cable Enterprise.

It is stated that the committee appointed recently by the local Chamber of Commerce in London to investigate the feasibility of laying an ocean telegraph cable from this point to Australia has reported in favor of the project, and estimates the cost of a cable line from San Francisco to New Zealand by way of Honolulu and Tutuila at $10,000,000. It is urged that the line would be a paying investment, as it would secure the whole of the Hawaiian business, all of the business of Pacific Islands centering at the Samoan group, and all of the United States business of the Australian colonies and New Zealand, together with a large percentage of the colonial business with the United Kingdom and Europe. The cost of cabling from Sydney to London, it is estimated, would be reduced to 87 cents per word. It is suggested that the United States Government grant a subsidy for the purpose to the extent of guaranteeing three per cent. per annum of an investment of $10,000,000 bonds to be issued by a company incorporated under the laws of the United States.

### "Telegraphing in Battle."

The September number of the *Century*, says the Scranton *Truth*, possesses a degree of local interest of more than ordinary importance, from the fact that one of its most interesting articles is contributed by Dr. J. Emmet O'Brien, of this city, under the title "Telegraphing in Battle." There was no braver or more effective arm of the military service during the civil war than the heroic corps of telegraph operators who mingled the lightnings of electricity with those of battle, and who stuck to their posts amid the stormiest thunders of the conflict. Dr. O'Brien, who contributes this admirable article to the *Century*, and his brother, Mr. Richard O'Brien, the efficient superintendent of the Western Union Telegraph Company in this district, bore a brave and honorable part in that heroic service, and it is no more than stating a simple fact to say that the *Century's* splendid annals of the war would be incomplete without the interesting and graphic chapter contributed by Dr. O'Brien on "Telegraphing in Battle." The article is illustrated, and its strong, simple and direct style shows that its talented author can handle the pen with as much facility as he did the telegraph key in his boyhood days. It is a decided acquisition to the *Century's* splendid series of battle sketches, and will be read with deep interest.

### Addition to the Phonograph.

At a recent meeting of the French Academy M. Lippmann presented a note by M. G. Gueroult, in which it is suggested that by the combined use of a phonograph and an apparatus for instantaneous photography and reproduction of the pictures obtained it would be possible to reproduce at any future time not only the future speech of a person, but also bring before the audience a vivid picture of the person's gestures and facial expression.

The procedure would be somewhat as follows: A person speaking or singing into the phonograph would be photographed by an automatic apparatus geared with the barrel of the phonograph. The pictures would be instantaneous, and taken at the rate of, say, ten pictures per second. They would then be developed and arranged in a special lantern for reproduction on a screen isochronously with the phonograph, when the latter is reproducing the speech. An audience might thus be enabled not only to hear the utterances of, say, a famous actor, but also see himself and his actions represented on a screen. About a year and a half ago M. A. Bandsept, of Brussels, experimented with a similar apparatus.

### Electric Lights for Convicts' Cells.

The cells of the 700 convicts in the Northern Indiana Penitentiary, at Michigan City, will be illuminated by electricity after September 1. The board of directors have adopted the incandescent system. Every cell will have one lamp. The convicts have heretofore been allowed candles, but under the new method of illuminating the officers will have the assurance that all lights are extinguished on time.

### Transmission and Distribution of Motive Power.

Our contemporary, the *Electrician* (London), says that "in the discussion of alternate-current motors, and indeed of electric motors in general, sufficient stress is seldom laid upon the distinction between the *transmission* and the *distribution* of motive power. It requires no argument to prove that these are two distinct problems. A type of motor which may prove admirably adapted for the steady conversion of electrical into mechanical energy (at the rate perhaps of some hundreds of horse-power) might easily become valueless if built upon a smaller scale and set to do intermittent work under varying conditions. The continuous current motor has long furnished an adequate solution of the distributing problem (though it still remains absolutely without illustration in this country). But whilst little has been said about it, the fact is generally recognized that for the transmission and conversion of energy upon the larger scale with continuous currents an upward limit is soon imposed by reason of the very serious difficulties of dealing with high tension in such machines. So far as the motor itself is concerned, these difficulties make themselves apparent with continuous current machinery at a far earlier stage than is the case with alternators, and we do not hesitate to express the opinion that if ever Sir William Thomson's vision of the utilization of the Falls of Niagara is realized, it will be by means of the alternate-current motor. We say this in spite of M. Leblanc's confident assertion that the synchronizing motor (of the type identical with the generator) is necessarily inefficient. It is true that the maintenance of cophasial synchronism necessarily demands a certain expenditure of energy—it is also true that this is wasted as heat in the coils of the armature, but in the absence of direct experimental evidence it would seem that M. Leblanc is somewhat rash in asserting that this loss is necessarily so great as to seriously impair the efficiency of the system. We anticipate that Mr. Mordey will before long be in a position to throw some light upon this important point.

"Since the above notes were written, it is stated in *Comptes Rendus* that M. Leblanc has himself invented and constructed an alternating motor of a novel and highly remarkable type. On another page will be found a full translation of the brief memoir in which the inventor has submitted his solution of the problem to the French Academy. It must be admitted that the absence of diagrams, and the somewhat complex character of the design, renders the description not altogether as intelligible as could be wished."

* * An electric motor is employed at the Altoona shops of the Pennsylvania R. R. in boring out locomotive cylinders. There are now being installed at their shops two 50-light arc machines and an incandescent plant.

* * The trial trip of a novel electrical yacht was made a few days ago from the Penn. R. R. pier at Jersey City down as far as Liberty Island. In the cabin lockers of the "Electron" were 200 Faure accumulators which, representing 80½ h. p., were furnished by the Electrical Accumulator Company of New York, and which supplied power to a 10 h. p. motor concealed beneath the floor of the cabin. With this motor and the 200 cells all charged, the "Electron" would run 80 miles at a speed of eight miles per hour.

* * Robt. McCulloch, directive head of the syndicate controlling the Broadway and other car lines, at St. Louis, Mo., says that the reconstructed electric system on the south end of the road will be given another start. The cost of the change has been over $50,000. If successful, Mr. McCulloch says there will be no delay in putting the system in working shape on both ends of the road. If the system is successful there will be no delay in giving trial of some other rapid transit system. In the meantime he has added 20 additional cars to the line, and put the cars in running order, only two minutes apart.

### Telegraphy Regarded from a Financial Point of View—High Speed and Low Speed.

It is now notoriously admitted by everyone that telegraphy, along with its undeniable political and moral aspect, has also a financial side not less evident.

As a public service its mission is to furnish a trustworthy instrument for the prompt exchange of ideas, and to render its means of communication available for the mass of the public. It is important that the country should be able to make use of the telegraph to the utmost limit of possibility, the increase of the number of telegrams contributing incontestably in no small degree to the development of national prosperity.

As an industry, the fundamental point to be reached is to bring in the greatest profit. But in a great number of countries the telegraph, far from yielding a profit, does not cover expenses. What means can be employed to remedy this situation? Shall the price of telegrams be increased?

To demonstrate the slight efficacy of a rise in charges, I will confine myself to a single instance, but which, I hope, will be considered decisive.

Conjointly with the adoption of the scheme of charging per word, the cost of internal telegrams in Switzerland has been raised to such a point that the mean returns per dispatch which, prior to October 1st, 1877, were 55 centimes, during the three first months of the innovation rose to 71 centimes, or an increase of 16 centimes. But as we learn from the Report of the Administration of the Swiss Telegraphs, on its working in 1877, it was expected that the average number of words, which was still 16.24, would gradually sink to 14, whence there would result only the modest increase of 10 centimes per telegram.

The following table indicates the financial results of working according to official data published up to this day:

| Years. | No. of tel'grams | Difference from 1876 | Returns | Differ. from 1876. |
|---|---|---|---|---|
| 1876..... | 2,118,373 | ..... | 1,164,513 | ..... |
| 1877..... | 1,950,546 | — 167,827 | 1,138,366 | —26,147 |
| 1878..... | 1,560,108 | — 558,265 | 1,100,404 | —64,109 |
| 1879..... | 1,679,881 | — 438,542 | 1,158,684 | — 5,829 |
| 1880..... | 1,751,018 | — 367,355 | 1,202,447 | +37,934 |
| 1881..... | 1,837,385 | — 280,988 | 1,221,061 | +56,548 |
| 1882..... | 1,790,311 | — 328,062 | 1,191,556 | +27,043 |
| 1883..... | 1,750,045 | — 368,328 | 1,137,050 | —27,463 |
| 1884..... | 1,724,989 | — 393,384 | 1,116,067 | —47,846 |
| 1885..... | 1,759,054 | — 359,319 | 1,138,507 | —26,006 |
| 1886..... | 1,793,938 | — 324,435 | 1,159,083 | — 5,430 |
| 1887..... | 1,816,594 | — 301,849 | 1,177,107 | +12,594 |
| Total since 1878 | 17,493,903 | —3,690,527 | 11,602,566 | —42,564 |

If we suppose that with the maintenance of the old scale of charges the internal tariff of the Swiss offices, the number of which has increased by more that 300 from 1876 to 1887, had merely reached each year the figure shown in 1876, we should have had in the decennial period 1878–1887 21,188,730 telegrams, yielding 11,645,130 francs or 3,690,000 telegrams and a return of 82,500 francs in excess of what has taken place.

In 1876, the number of telegrams exchanged with foreign countries, the international correspondence at the end of the 10 years period would be 5,876,700 telegrams. But there have been in reality 8,214,211; that is to say, 2,337,000 in excess. Thus, whilst on the one hand the home correspondence, as compared with 1876, shows a decrease of 14 per cent., the foreign correspondence, on the other hand, has increased by 71 per cent.

II.—The increase of charges not giving the result expected, let us see if by a reduction of the price of telegrams we might prepare budgets which should show a favorable balance.

The partisans of this measure ask why, if we wish to extend the use of the telegraph and make it an excellent source of revenue for the treasury, we do not do with it as we have done with the post, since the decrease of postage to a uniform and very trifling sum has yielded such happy results.

To this observation, which was made at the Telegraphic Conference which sat at Berlin in 1885, the Italian delegate, Sen. D'Amico, replied: The post can double its traffic with a slight increase of outlay, whilst in the telegraph a small increase of dispatches would suffice to require new wires, new apparatus, and new officials.

Such is the fact. The post both in point of time and of material transmits a thousand, ten thousand, fifty thousand letters as easily as a hundred. The whole goes off in the same train. But the telegraph can, generally speaking, only forward one dispatch at a time and must be equipped on a vast scale to be in a position to preserve a reasonable mean speed for correspondence. Hence, an increase of traffic may sometime involve an increase in the facilities for working, sometimes in a very rapid proportion. Under these circumstances we must use circumspection in estimating the increase of profit which would result from an influx of telegrams.

Still we cannot deny that the telegraphic systems in general have still on their lines a very fair margin. If we examine tables showing the occupation of the lines, we discover everywhere blank intervals in their working in the main lines, as well as in those of an inferior order. Thus it is evident that all the wires are capable of a greater sum total of work. But the increase of work should not be produced at hours of the day when the lines are already sufficiently engaged.

Save this reservation, there is still more than one stage to be traversed before the transmitting power of the net is carried to the maximum, which is the basis upon which rests all the economy of the telegraphic service.

This leads us in the third place to the examination of the means indicated as leading to the desired solution.

III.—The means which, in my opinion, whilst developing the traffic, would increase the returns, and the application of which would direct the institution towards its double object, consists in the classification of the dispatches under three heads:—

1. Telegrams for accelerated transmission (urgent telegrams) to be sent in preference to dispatches of the following class.

2. Telegrams for normal transmission.

3. Telegrams at low speed (with a reduction of price) to be sent after the dispatches of the second class have been finished.

We may first note that with the exception of the four following States, Great Britain, Bulgaria, Norway and Switzerland, "urgent telegrams" are already admitted in European relations, and let us observe that these full speed correspondences, the utility of which is duly recognized, do not come in in such numbers that their treatment can sensibly affect the rapidity of transmission of ordinary telegrams. Further, if the number of the former increased so as to become an obstacle to the free disposal of the general correspondence, the extra fees which would be charged would largely contribute to the expenses of laying down and operating new wires, and apparatus for multiple transmission where the want was felt.

The telegram of the third class (low speed) which would be the complement of the urgency telegrams (high speed) has not yet made its appearance in Europe.

I have shown elsewhere what might be expected from a reduction of charges for correspondence which might undergo a delay in transmission without running the risk of failing in their object. These telegrams would be numerous, seeing that there are thousands of circumstances in life in which the telegraph would be utilized, to get rid of small epistolary jobs which generally cost more time than we care to devote to them. And as the transmission of slow telegrams might be effected at moments when at present the wires are unoccupied without increasing the outlay the profits would accrue to the treasury.

On the lines which are now idle for the greatest part of the day, the creation of a class of cheap telegrams between the offices on such lines would be equivalent to a general reduction of charges, and the results which might be involved would not necessitate any increase in the means of transmission.

Here are a few figures which show what gaps still exist in the working of the lines: Among 387 Dutch offices there were in 1887 134, which, on the average, sent out only five telegrams daily; in 1886 in Switzerland among the 1,222 offices, there were 1,062 which sent out less than 10 telegrams daily, and 159 with less than one telegram daily. And it will be something similar everywhere.

It is evident that where there exists a wire, an apparatus and an official, the tariff which lets all these elements of production stand idle instead of keeping them employed has something wanting, for work alone yields receipts, and the expenses go on always whether the line works or stands idle.

Hence it follows that in searching for measures which would lead to a maximum employment of the wires it is proper to follow the advice of economical science, which, if applied to telegraphy, declares that *within the limits of the organization of the lines* it is more profitable to transmit despatches cheaply than not to transmit them at all. We may differ as to the method of applying this principle, but it is nevertheless the only one which remains applicable, industrially speaking.

From the moment when we recognize that telegraphy contains the commercial element, we have only to follow the track which the nature of the case has distinctly proved, and introduce measures which free-trade would not for a moment hesitate to apply.

After having contended that if the end proposed is to render telegraphy available to more persons, and to make of it, if possible, at the same time a source of revenue, M. E. Cuper asserts that we must look for inspiration to commerce, to the great industries to companies. In developing this idea, he adds:

"On railways, are not there transports of goods by swift and slow trains? Are there not express trains, direct, semi-direct and 'omnibus trains,' which everyone is free to use, according as he is more or less pressed for time? By the express and direct trains only the great centers are placed in communication, and for some hours the other towns situate along the line are as if non-existent. Why are not 'omnibus trains' the only ones in existence, seeing that they are the only ones which can, for financial reasons, be utilized by everyone? In one and the same train are there not often first, second and third class carriages? Certainly the first class does not arrive sooner than the third, and this division merely gives the traveller the option of seating himself more or less comfortably, and of spending only what he wishes, or what he can. Can he not even, if needful, have a special train?

"All these distinctions, based upon advantage and free choice, are a means of connection more certain than would be absolute uniformity.

"The post itself, has it not registered letters, the carriage of which is certainly not more rapid, but the delivery is more certain? In a word, take all the great undertakings which affect the public, and you find various grades of price uniformly varied."

IV.—After having explained the different grades of urgency for telegrams, it remains merely to show the advantages of the system proposed. These advantages would appear:—

1. In an increased transmission power of the system of wires, by leaving to the last place the transmission of telegrams which will bear delay, we should enlarge the means of action for business hours, which would enable us, without additional expense in wages, to increase the total number of transmissions effected on the totality of the lines in a given time.

2. By a development of the traffic in consequence of the reduction of charge for slow telegrams.

Thus regarding the situation which would be created, we may consider the innovation useful, since it would postpone the time when additional means of transmission would be needed. It would lead to the full utilization of the resources of the wires.—*P. G. H. Linckens, Commissioner in the General Direction of Dutch Posts and Telegraphs, in Journal des Economistes.*

.... In France a system of universal telegraphic language is proposed, which it is claimed would be of great service to the public.

## TELEGRAPHIC

.... The Empire and Bay State Telegraph Company is putting four new wires on its line through Connecticut and the linemen have met with no opposition except at Melrose. Mrs. Frank Gowdy ordered the men to stop work and used a shot-gun to emphasize her order. The men gave up the field to the armed force.

.... The statement of the Mexican Telegraph Company for the half year ended June 30 shows: Surplus above dividend of Jan. 12, 1889, $241,931; net receipts, all sources, $155,677; total, $398,608. Dividends, $71,720; surplus above dividend July 12, $326,888. The company paid five per cent. on its stock for the half year and earned over 10 per cent.

.... The Central and South American Telegraph Company, for six months ending June 30, shows: Surplus above dividend of Jan. 5, 1889, $331,596; net receipts, all sources, $258,144; total, $589,740; dividends, $140,231; surplus above dividend of July 6, $449,509. This surplus remained after paying two quarterly dividends of 1¾ per cent. or 3½ per cent. for six months, against earnings of 6.3 per cent.

.... The new lines of the Commercial Union Telegraph Company, of Maine, are up as far as Auburn, Lewiston, Brunswick and Bath, and the offices at these points were opened last week. Work is being pushed all along the line, and the offices at Augusta, Hallowell and Gardner will be opened in September. The linemen are now stringing the wires at various points, and the energetic officers of the line propose to have things move right along.

.... It is announced that M. Courton, a chemist, produced recently at the sitting of the French Academy of Sciences, a sealed envelope containing a description of an apparatus by means of which objects may be seen at vast distances, the vibration of light being transmitted. About four years ago Herr P. Nipkow described his "electrical telescope," an invention based on the same idea, and only a few weeks ago Herr Korzel showed the practicability of the idea by exhibiting to a party of scientists in Berlin the image, received on a glass plate, of a friend who was at that moment speaking to him through a telephone in Potsdam. Edison is also at work on a similar machine.

.... Almost the first question asked by the manager of an electric light company when an application has been made to power, is: "How much electric power must I allow per car?" No man can give a definite answer to this question that will meet all conditions. If the following facts are known, a fair judgment can be made: 1. Number of cars simultaneously operated. 2. Speed and nature of service. 3. Maximum grade, and number of grades. 4. Scheduled location of cars in reference to grades. 5. Motor cars to be used to tow other cars or not. 6. Any peculiarities in regard to the distribution of cars. 7. Condition of track. 8. Location of track in reference to power-house.

.... The following letter has been received by Supt. Gill, of the Western Union Telegraph Company, of Philadelphia, from Helen Wallace Hinckley, secretary of the Children's Aid Society at Johnstown, Pa.:

"DEAR SIR—Will you kindly see that the Western Union Telegraph Company receives the earnest thanks of those engaged in work for the relief of mothers and children at Johnstown and from Philadelphia since the flood. The above company at once placed their wires most generously at the command of the Children's Aid Society, in so far as delivering free of charge all their messages. This has been of such comfort and assistance in facilitating all work of the Johnstown children's aid office that I am moved to send, on behalf of that office, this expression of heartfelt thanks. Personally, I would add most earnest thanks also. Very truly yours,

"HELEN WALLACE HINCKLEY.

"August 9."

* * A new Westinghouse device for signaling from the conductor to the engineer on a moving train is being tested on the Toledo Division of the Michigan Central.

* * Transfer tables of the Fitchburg R. R. Co., at their car shops at Fitchburg, Mass., are now operating successfully. Storage batteries and the overhead trolley wire system of the Union Car Company are used.

* * The electric road at Beverly, Mass., using the storage battery system will be running in a short time as the construction work is about completed, and the cars for the road will arrive in a few days.

* * The Georgetown (Md.) and Tenleytown Electric Railway Company broke ground at 7 o'clock Monday morning. The construction of the road will be pushed under the immediate supervision of Gen. Drum.

* * The contract for the building and equipment of ten miles of electric street railway at Kearney, Neb., has been given the Thomson-Houston Company. The road is to be completed and in operation January 1, 1890.

* * The Daft road running through Meriden, Ct., and now operated by the overhead trolley system, is changing its equipment so that the trolleys, instead of running on top of the wires and supported by them, will make contact from below.

* * The Street Railway Company at Covington, Ky., has finally decided to accept the rapid transit ordinance recently passed and will at once begin the survey for the electric road. The first line to be altered is the Covington branch of the Madison avenue line.

* * The sum of $45,000 has been subscribed as a subsidy for the new line of electric railway that will connect the beautiful heights southeast of Portland, Ore., with the heart of the city direct. The completion of this line is promised by the latter part of September.

* * The Connecticut Motor Company, located at No. 42 Union Place, Hartford, is to remove to Southington about the middle of August. The capital stock, now $12,000, will be increased to $26,000, the necessary money having been raised by the manufacturers and people of Southington.

* * The stockholders of the Citizens' Passenger Railway, of Norristown, Pa., are contemplating the sale of the road to the New York Improvement Company. It is the intention of the New York parties, should they acquire possession, to substitute electricity for horses as motive power.

* * Twelve new motors and 15 coaches will be added to the rolling stock of the Omaha electric railway. When these are in use the company can run 28 trains comprising 61 cars. Various extensions nearing completion and increased business is the moving cause of these extensive improvements.

* * The Electric Railroad Company, of Chattanooga, Tenn., composed of Charles A. Lyerly, Edward Watkins and Samuel W. Divine, has bought out the controlling interest in the City Street Railway Company and taken formal charge. Horses will be replaced as soon as possible by electric motors on all the lines, using the Sprague system.

* * H. R. Hewitt, of Minnesota, has disposed of his interest in the Stillwater electric street car line to E. D. Allen, of Davenport, Iowa. The consideration is not given, but it is considerably over $30,000. The exclusive owners of the road now are Dr. W. L. Allen, president; T. O. Swiney, vice-president, and E. D. Allen, secretary and treasurer.

* * The capital stock of the National Electric Traction Company, Detroit, Mich., has been increased from $100,000 to $200,000. The principal stockholders are Hugh McMillan, John M. Nicol, C. Corbett, W. A. Jackson and Frank E. Snow.

* * A compromise between the friends and opponents of the electric road proposed by the South Covington, Ky., and Cincinnati Street Railway Company, making some concessions, is proposed, and will doubtless result in the ultimate construction of the road.

* * The Watervliet Turnpike and Railroad Company, of Albany, N. Y., still hope to have the electric cars running in time for the State fair. The 12 cars are being equipped with the necessary machinery. Each car when completed will weigh about five and a half tons, and will be lighted with the incandescent light.

* * The Select and Common Councils of Lebanon have adopted the report of the committee on conference on granting the franchise to the Lebanon Electric Railway Company for the building of a street passenger railway through the main thoroughfares of the city. It will be eight miles in length, and its construction will be commenced at once.

* * The Cincinnati (Ohio) Electric Light and Power Company have secured a large property at the corner of Broadway and Hunt street, and have commenced work breaking ground for their new electric light plant. The contemplated plant will have a capacity of 1,000 arc and 10,000 incandescent lights. The well known Thomson-Houston system is to be used.

* * The Pittsburgh, Knoxville and Mt. Oliver (Pa.) Electric Railway Company intends to resume running its cars after an interval of three months devoted to experiments with storage battery systems. The style formerly in use burnt out in a mysterious manner, but it is thought a check upon the battery has been devised by which the cars can be operated successfully.

* * The trustees of the Polytechnic College of Pennsylvania, the sessions of which begin about the middle of September, are fitting up on the lower floor of the college building, on Seventeenth street, above Cherry street, an electrical laboratory. The laboratory will be provided with tools for the manual training of students in the construction of the modern forms of electrical apparatus and machines.

* * As the work at Schenectady, N. Y., on the new hotel to be called the Edison advances, it discloses what will be a remarkably handsome building. The Edison machine works are putting up three new buildings, which will be 200x300 feet. The company expects to complete these before cold weather sets in, and an additional force of about 500 men will be employed. This will make the total force about 2,000.

* * The East Cleveland Railway, of Cleveland, Ohio, has now in operation about 17 electric cars on the Sprague system. During the month of May, 1889, this railway had 17 cars on duty. During this time the cars covered the aggregate distance of 45,640 miles, making the average car mileage per day 93.72 miles. During the month

| | | | | | |
|---|---|---|---|---|---|
| 2 | runs of | 193 | miles | per day | were made. |
| 2 | " | 190 | " | " | " |
| 1 | " | 170 | " | " | " |
| 1 | " | 165 | " | " | " |
| 3 | " | 159 | " | " | " |
| 4 | " | 153 | " | " | " |
| 6 | " | 148 | " | " | " |
| 9 | " | 142 | " | " | " |
| 31 | " | 136 | " | " | " |
| 23 | " | 131 | " | " | " |
| 22 | " | 125 | " | " | " |
| 1 | " | 121 | " | " | " |
| 23 | " | 119 | " | " | " |
| 27 | " | 114 | " | " | " |
| 37 | " | 108 | " | " | " |
| 34 | " | 102 | " | " | " |

The maximum run for the month of one car was 3,536.46 miles, or an average per day of 114.08 miles. One car for eight successive days made an average of over 143 miles. The kind of duty required of these cars was of the hardest variety. There were no reserve cars, and each car was required to do constant service. Each car had to be run at the highest rate of speed.

### The Snelgrove Electric Weighing Machine.

Our esteemed contemporary, the London *Electrical Review*, says of this machine, which is now exhibited in England for the first time, is the invention of Mr. Wm. Snelgrove, experimental engineer to the exhibitors, Messrs. W. and T. Avery: It may be generally described as a self-balancing, self-indicating lever weighing machine, and apart, therefore, from the fact that it embodies the first application of electricity to the control of a weighing machine, may be said to be unique, being, in fact, the first and only self-indicating knife-edged machine in the world. The lever weighing machine, with knife edged centers, has long been recognized by engineers as the only truly accurate form of apparatus for weighing. In recent years, however, a considerable demand has arisen for self-indicating dial machines, and various forms of spring balances, pendulum balances, hydrostatic or hydraulic weighing machines, etc., have been produced to meet this demand.

The whole of the mechanism for balancing the machine and indicating the weights being confined to the steelyard or beam, it must be understood that in all other details the machine is of the ordinary platform or weighbridge type, the machine being mounted on a suitable pillar, and the back centers connected as usual by a shackle and link to the lower levers carrying the platform.

It indicates, by means of revolving dials, up to 10 cwt., by graduations of 1 lb., the weights being shown through the three windows showing cwts., qrs., lbs., respectively.

The machine under notice has two movable slides or poises, the small poise being equivalent to 27 lbs., and giving 27 indications of 1 lb. each, and the large poise being equivalent to 9 cwt. 3 qrs. and giving 39 indications of 1 quarter cwt. each, one step or indication of the heavy poise being equal to the entire travel of the small poise.

Each poise is provided with wheels or rollers at both ends, the large poise travelling on the steelyard and the small poise travelling on rails attached to the steelyard. Each poise is cut with ratchet teeth on the upper and ordinary spur teeth on the lower sides.

The ratchet teeth, whose vertical sides face the zero end of the steelyard, engage with pawls pivoted on the framework of the machine, the lower racks gearing into independent loose pinions fitted with clutch boxes sliding on a main spindle. The spindle is revolved by a small electro-motor, and is provided with one fixed clutch box with two clutch faces in close proximity to the loose pinions and clutches.

Electro-magnets are arranged to lift the pawls, and other electro magnets are provided to pull the loose clutch boxes in and out of gear with those fixed on the spindle. Springs are also fitted to pull the clutches out when the said magnets are demagnetized.

At both extremities of the travel of each poise current switches are arranged to be operated by the poise itself. The outward movement of the poises is effected by the electro motor, the inward movement or return to zero by means of helical springs which are coiled up during the outward travel of the poises.

Electrical contacts are fixed on the upper and lower jaw of the carrier and on the free end of steelyard, which is free to move between the said jaws.

One pole of a battery is connected to both jaws of the carrier, the other pole by means of a flexible conductor, to a terminal near the centers of the steelyard. The electro-motor and the clutch-withdrawing magnets are included in the circuit of a second battery, connected by terminals and a flexible cord near the centers.

The carrier is provided with an electro-magnetic brake in circuit with the carrier contacts to check undue vibration of the steelyard, and without affecting or impairing the sensitiveness of the balance to stop the vibrations, after equilibrium has been obtained.

The second battery circuit, including the electro-motor, is normally open, but is closed by means of an electro-magnet switch included in a circuit from the upper steelyard contact only.

When the steelyard is resting on the lower jaw of carrier, the first battery is in circuit with the pawling-lifting magnets, and the motor battery circuit is open. With the steelyard against the upper jaw, the first battery is in circuit with the clutch-operating magnets and the motor battery circuit is closed. With the steelyard in equilibrium or all the poises at zero, or at the further extreme limit of their travel, both battery circuits are open, and the machine comes to rest.

The action of the machine is as follows: On the load being placed on the platform the steelyard rises, and presses against the upper end of steelyard carrier and thus closes a circuit of one battery. Included in this circuit is the brake electro-magnet, the motor relay, the switch, and the small poise clutch-magnet; the motor therefore starts, and the small poise being drawn into gear with the main revolving spindle, travels out on the steelyard until (unless it previously balances the load) it strikes the switch lever; the small poise clutch magnet is thereby cut out of circuit, and the large poise clutch magnet is included instead. The small poise being released from the clutch, would now travel back to zero, propelled by its helical spring, but it is held in its outward position by its pawl. The large poise is now travelling out on the steelyard until (unless it previously balances the load) it strikes its own switch lever, thereby cutting its own clutch magnet out of the circuit.

Thus, should the load on the platform exceed the capacity of the machine, all the circuits are broken and the whole of the mechanism comes to rest. Supposing, however, that the platform load is balanced on the large poise, reaching a certain point in its travel, the action of the machine will be as follows: On the load being balanced, the steelyard will fall away from the upper contact, thereby breaking the circuit completely at that point. The clutch magnets of the large poise and the motor relay will be demagnetized, the motor relay armature springing back into normal position, cuts the motor out of circuit and for a short period passes the current of the motor battery through the clutch-withdrawing magnet of the large poise. The large poise is now released from the motor and (although the latter may continue to run by momentum for some seconds) is instantly stopped and held by its pawl, against its return spring.

In this position it will have either exactly balanced or over-balanced the platform, in the former case nothing further need be said except that the figured dials will indicate at a glance the exact weight on the platform.

The poise may, however, be said to have over-balanced the load (in 99 cases out of 100 this will be the case), consequently the steelyard will drop from the upper and rest on the lower contact screw of the end carrier. A battery circuit will then be closed, including the brake on the end carrier, small poise, rear switch, and the small poise pawl magnet. The latter will then lift the pawl, and the small poise will then run back until by balancing the load the free end of steelyard rises from the lower contact. The instant the steelyard rises into equilibrium, the pawl will engage and hold the small poise. The dials will now indicate the correct weight. Should the small poise run too far back, the rise of the steelyard to the upper jaw will again close the motor and clutch circuits, and the small poise will again travel outward to obtain equilibrium.

The poises therefore cannot come to rest until they have obtained such a position on the steelyard that the latter remains in perfect equilibrium between the two jaws of the end carrier, in other words, the machine itself insists on a perfectly true balance, and is practically incapable of indicating an incorrect weight

On removing the goods from the platform the steelyard drops on to the lower contact of carrier and the small poise pawl is lifted (as mentioned above) allowing the small poise to run backwards on the rail until it strikes its own rear switch. The latter being pressed back by poise cuts out the small poise magnet from the circuit and includes instead of it the large poise pawl magnet.

The large poise pawl is thereupon lifted, and the large poise travels back until it strikes against its own rear switch lever, the latter being pressed back breaks the circuit completely. The two poises are now at zero, both batteries are on open circuit, and the machine is ready for a fresh load. The operation of weighing is performed by the machine in a small fraction of the time it takes to describe it. A perfect equilibrium is obtained in from six to twelve seconds after loading the platform, while two or three seconds suffice for the return of the poises to zero on removing the load. It will thus be apparent that the entire action of the machine is entirely automatic.

The essential point in the construction of the machine is that with any load on the platform the poise or poises will not come to rest until they have obtained the exact positions on the steelyard that enable them to balance the load. The machine thus automatically insists on a perfect equilibruim, before its revolving dials will stop permanently at any group of figures. In the designing of a machine of this description it will be evident that a large number of points have to be considered.

In the Snelgrove weighing machine the whole of the electro-magnetic mechanism is attached to the steelyard itself, which is then as free to vibrate or oscillate as one of the usual pattern. This is a very important matter from a weighing engineer's point of view. Moreover, the mechanism must be so designed that no revolving or reciprocating parts can, when in motion, cause fluctuations in the center of gravity or balance of the steelyard.

A multiple arrangement of poises (without which fine indications would be impossible on a steelyard of any reasonable length) requires that the large poise shall only come to rest exactly at pre-determined points, and as a variation in the resting point of $\frac{1}{16}$ of an inch might make an error on the platform of half a hundredweight, it is practically impossible with any system of direct gearing to carry the poise out and stop it with such exactness.

In the Snelgrove machine, however, the most absolute accuracy is attained by ensuring the slight over-running of the poises, and the return of them and fixture at the predetermined points by the elastic power of the helical return springs. One more point may be noted, and that is the brake on the free end of steelyard.

This, at first sight, would appear to impair the sensitiveness of the balance, but it is not so. It was found that frequently, when actually balanced by the poises, the momentum of the falling steelyard would carry it to the lower jaw, and consequently close the return circuit, resulting in waste of time. The brake shown is so arranged that it is held by its electro-magnet, which is in circuit with both jaws of carrier, quite clear of the steelyard end, at the moment of the latter attaining equilibrium; but applies itself immediately the steelyard breaks contact with either jaw, and checks the momentum and limits the oscillation.

The electric current required to operate the machine is supplied by a small constant battery, concealed in the base, for the usual intermittent work on an ordinary weighbridge. Leclanché cells have been found very satisfactory.

The electric connections and current switches require no attention or manipulation whatever, as they are automatically controlled by the machine itself, on placing the goods to be weighed upon the platform, the machine itself closes the electric circuit, and thus obtains the current necessary to operate its mechanism. The attendant, therefore, beyond placing the goods on the platform, does not touch the machine.

The entire cycle of operations, switching on the current, balancing the machine, indicating the discovered weight in a single group of figures, returning the mechanism to zero when the goods are removed, and finally switching off the current when the weighing is finished to prevent waste being completely performed by the machine itself.

### Drop-Forged Commutator Bars.

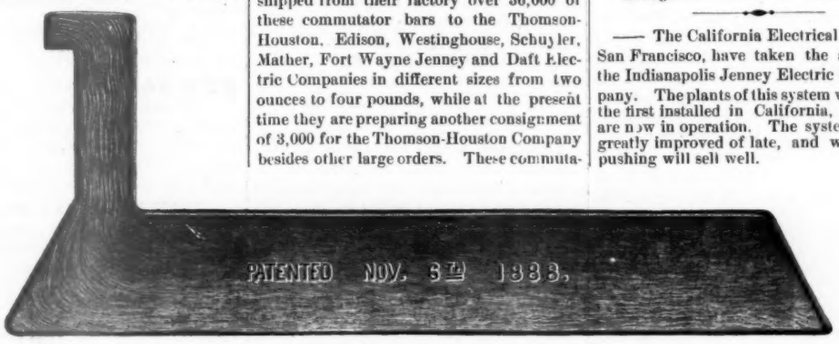
We present to the readers of the REVIEW an illustration of a commutator bar cast from one solid piece of unalloyed copper, the method of which is the invention of Mr. C. E. Billings, of the Billings & Spencer Company, of Hartford, Conn.

Commutator bars formerly were either cast of an alloy containing as great a proportion of copper as possible, or made in two parts, the larger portion of which was pure copper while the other part was a castable alloy, which were soldered together. In the former case the conductivity was not equal to that of copper, while in the latter the cost of manufacturing was somewhat expensive.

A visit to one of our large electrical laboratories, where Mr. Billings witnessed the great difficulty experienced by the workmen under the old mode of manufacture, convinced him that these obstacles could be overcome, and his ideas, discredited at first by electrical men, led to the above invention.

Through this new system these bars are drop-forged, of one single piece of unalloyed copper, and are of a perfectly homogeneous molecular structure throughout, the fibre or grain of the copper, as shown in illustration, being so arranged as to be everywhere parallel with the axis of the arm, and of the greatest possible density.

The Billings & Spencer Company have shipped from their factory over 36,000 of these commutator bars to the Thomson-Houston, Edison, Westinghouse, Schuyler, Mather, Fort Wayne Jenney and Daft Electric Companies in different sizes from two ounces to four pounds, while at the present time they are preparing another consignment of 3,000 for the Thomson-Houston Company besides other large orders. These commutator bars have been received with great favor by manufacturers of dynamos and electric motors generally.




BILLINGS NEW STYLE DROP-FORGED COMMUTATOR BAR.

### The Eickemeyer Dynamo and Motor Company, of Denver, Col.

This company was incorporated on August 22d under the laws of the State of Colorado, with Stetson Leach, L. M. Cuhbert and W. F. Reed as incorporators. The capital stock of the company is $30,000, and the officials elected by the board of directors to serve for the first year are: J. T. Lynch, of New York, president; Stetson Leach, of Denver, vice-president and general manager; and W. F. Reed, of Denver, secretary and treasurer.

The superior quality of the Eickemeyer dynamo has attracted the attention of the trade in Denver and throughout the State, and a number of large machines have about been negotiated for. Although the company has only recently organized, the outlook for a large and profitable business is very flattering.

This company will deal exclusively in the Eickemeyer dynamos and motors and the auxiliary appliances connected therewith. There is a growing demand in Colorado for a good dynamo and motor and the one this company offers seems to fill all the requirements. The fact that it is the dynamo and motor which is used by the Pullman Company in their shops and on their limited trains goes to show that if it were not all that is represented for it that the Pullman Company would never have adopted it.

—— The Edison machine works, at Schenectady, N. Y., have broken ground for three large buildings, to be erected adjoining their present establishment, the total cost of which will be $105,000. The works have been a valuable addition to Schenectady's industries and now employ 1,800 men.

### Electric Lights as Beacons.

It is said that the experiment of using electricity in lighthouses has been such an assured success, as demonstrated by application of the same at one of the beacons at Sandy Hook, N. J., that the lighthouse department has decided in future to have it applied to all lighthouses and lightships on the coast.

### Average Rate of Arc Lights.

We are in receipt of the following schedule showing the prices paid for all night lighting by 2,000 candle-power arc lamps in the following named cities:

| | No. lights. | Price per light. |
|---|---|---|
| Albany, N. Y. | 481 | $182 50 |
| Rochester, N. Y. | 222 | 104 50 |
| Kansas City, Mo. | 60 | 200 00 |
| Salem, Mass. | 160 | 164 25 |
| Hoboken, N. J. | 10 | 146 00 |
| Manchester, N. H. | 235 | 156 95 |
| Fargo, Dak. | 25 | 240 00 |
| Newark, N. J. | 81 | 146 00 |
| Dayton, O. | 122 | 150 00 |
| Akron, O. | 171 | 157 48 |
| Kalamazoo, Mich. | 128 | 192 50 |
| Springfield, Ill. | 100 | 137 50 |
| Boston, Mass. | 700 | 237 50 |
| Des Moines, Ia. | 88 | 141 00 |
| Texarkana, Ark. | 18 | 160 00 |
| Grand Rapids, Mich. | 110 | 140 00 |
| Washington, D. C. | 350 | 182 50 |
| Camden, N. J. | 85 | 146 00 |
| Plymouth, Pa. | 12 | 146 00 |
| Duluth, Minn. | 180 | 127 00 |
| Scranton, Pa. (Coal Dust Fuel) | 322 | 73 00 |
| Binghamton, N. Y. | 100 | 140 00 |
| Syracuse, N. Y. | 300 | 144 00 |
| Fall River, Mass. | 50 | 180 00 |
| Philadelphia, Pa. | 33 | 200 75 |
| Aspen, Col. | 16 | 216 00 |
| Montgomery, Ala. | 100 | 155 18 |
| East Saginaw, Mich. | 126 | 140 00 |
| Average | | $160 59 |

—— The California Electrical Works, of San Francisco, have taken the agency for the Indianapolis Jenney Electric Light Company. The plants of this system were among the first installed in California, and many are now in operation. The system has been greatly improved of late, and with proper pushing will sell well.

—— Professor Thomson, of electric welding fame, has just perfected an invention by which the rails of street or steam railways way be welded together by electricity after being placed in position. A dynamo propels over the track an electric welding machine, which welds the rails in one continuous line after it passes over them. It is proposed to have at every 100 feet a break to allow for expansion.

—— The works of the Robinson-Foster Electric Motor Company at South Peabody, Mass., are now in the hands of a keeper, placed there by F. W. Prescott, who holds a chattel mortgage against the company. The property was to have been sold, but the auctioneer was stopped by an injunction obtained by the company at the last minute. It is expected that a settlement will be made. Work was started in April, and 75 hands were employed turning out 150 motors. Most of these have been put out on trial, but the company hopes to raise money on them and continue business.

—— S. T. Johnson, the local manager of the Thomson-Houston Electric Company, of Minneapolis, Minn., says that the ordinance introduced at the council meeting the other night is simply a part of an interurban system which they propose to build and operate and which is not designed to compete with any other existing company. This company has a contract to build 237 miles of road in Boston. They have purchased the old Pray building in Minneapolis, and expect to invest $500,000 in that city. They propose to build five lines into the interurban district, at an expense of $3,000,000 to $4,000,000. One line will be a short line between the two cities, making only one stop, and probably completing the run in about 18 minutes. The fare will not be more than 25 cents.

## ELECTRIC LIGHT NEWS

—— All of the city and county buildings at Rochester, N. Y., are now illuminated by electricity.

—— The Thomson-Houston Electric Company has received an order from Osaka, Japan, for dynamos.

—— The scheme for lighting the entire city of Montreal, Canada, with 800 arc lamps, is almost completed. Most of the lamps are fixed and are in use giving satisfactory results.

—— The Oakland, Cal., Electric Light and Motor Co. has erected an iron tower 100 feet high, having five arc lamps to demonstrate the efficiency of its system for street lighting to the city.

—— The Ohio attorney general has decided that established gas companies cannot add electric lighting to their charters, although new companies dealing in both gas and electric lights may be organized.

—— The Baltimore & Ohio Company have concluded to do away with their present electric light machinery at Grafton, W. Va., and put in a larger and more powerful plant, capable of lighting the whole town.

—— The electric light company at Eastport, Me., have decided to put up a new building at the gas works, into which the electric light plant will be moved. They will add another engine and boiler and a 500-light dynamo to the works.

—— Rutland, Vt., has closed a contract with the Thomson-Houston Electric Light Company, which calls for 53 arc lights of 2,000 candle-power each, and 150 incandescent lights of 32 candle-power each. The work of putting in the plant has been begun.

—— We understand that the Brush Electric Company, of Cleveland, Ohio, has added a department for the manufacture of electric motors for street railway service. The company bids fair to make a success of its new departure, having quite a number of orders on hand.

—— The immense electrical plant that is now being erected at London, on the Thames River, will consist of at least six large buildings. The engine recently put in is of 5,000 horse-power, and runs one dynamo capable of generating electricity for over 40,000 lights. The driving wheel to this dynamo is over six feet in diameter. There are very few arc lights in London, as the majority of business men look with disfavor upon running any extra risk of fire.

—— The new Pullman vestibule sleeping cars, now in service on the Pennsylvania Railroad's New York and Chicago Limited, are illuminated not only by stationary electroliers, but by movable electric bulbs. These are attached by insulated wire to the window posts, and can be placed in any desired position. One can sit or lie in one's berth and read with the same facility as in one's private sitting room. The lights are of wonderful convenience to travellers who would spend their evenings in reading. Books are supplied from the library.

—— Mr. J. S. Humbird, assistant general manager of the Westinghouse Electric and Manufacturing Company, has returned from London, England, where he has completed the organization of the Westinghouse Electric Company, of London. The English company acquire the patents, good will, business and property of the American company known as the Westinghouse Electric Company, of Pittsburgh, Pa. The new company will manufacture and deal in every kind of engine, machine, wire, lamp or appliance capable of being used for the generation of electricity. The board of directors is composed of the following: Sir H. W. Tyler, M. P.; Francis Pary, John Dixon Gibbs, Wm. D. Oyley, C. Colin Macrae, H. Rudolph Laing, H. T. Norton, G. Westinghouse, Jr., and J. S. Humbird.

## KINDRED INTERESTS

**Partrick & Carter.** — This well-know Philadelphia house reports business never better. One feature of their business that makes them specially popular with all the construction companies is that they only manufacture and do not enter the general construction field. Their business is constantly increasing, and they are thoroughly awake to the progress that is being made in all branches of electrical work.

**The Pond Engineering Co.** are furnishing the Consolidated Electric Light and Power Company, of Kansas City, Kan., with an Armington & Sims engine of 100 horse-power and a Thompson indicator. Their Chicago representative will place in the Libby Prison, now being erected in that city, a second Armington & Sims engine to be used in driving Sperry arc lights. They are supplying the Exchange building, Kansas City, with a Hyatt filter, and Galena, Kan., with a 50 horse-power boiler. They have just shipped a small pumping outfit, including the boiler and necessary attachments, to Denison, Texas.

**Mr. J. J. Everingham,** representing the Thomson-Houston Co., at Omaha, Neb., is keeping up his usual good record of sales. He recently sold to the "Ballou Electric Light Co.," of Plattsmouth, 50 arc lights and 650 electric incandescents. These lights will be started in about two weeks. And also to the "Blair Electric Light and Power Co." a 650 alternate machine, which they hope to have in operation about September 15th to 20th. Other recent sales are the following: A 100-light incandescent plant to the "Kansas State Sugar Co." This plant is installed for the sugar works at Attica, Kansas. The lights there have just been put in operation and they are highly satisfied. A 200-light plant to the State of Nebraska which goes into the new asylum for the incurable insane at Hastings, Neb. These lights are expected to be started about September 15th.

**Electric Bells** have passed the experimental period, and now have become as staple an article as nails. With the constantly increasing demand for these goods has arisen a keen competition which has resulted, in many cases, in prices which are made at the expense of quality. The Electrical Supply Company, of Ansonia, Conn., and their Western branch, 171 Randolph street, Chicago, realizing the necessity of producing a bell which is not only first class in construction, but that it can be sold at popular prices, have recently disposed of their entire former stock of electric bells, and have just made and put upon the market an entirely new bell of superior construction. Their new bells have been made with the one idea in view, to give satisfaction to all that use them. They have been made in the best possible manner, with no superfluous material.

**The Ball Engine Company, of Erie, Pa.,** manufacturers of the Ball engine, report the following shipments for August to date: Edison Electric Illuminating Co., Brooklyn, N. Y., two 300 horse-power each; Queen City Electric Company, Cincinnati, O., one 150 horse power; Helvetia Silk Mills, Paterson, N. J., one 50 horse-power; Brooklyn Street Railway Company, Cleveland, O., one 125 horse-power; St. Clair Hotel, Cincinnati, O., one 25 horse-power; Cincinnati Hospital, Cincinnati, O. two 35 horse-power each; Plattsburg Electric Light Company, Plattsburg, N. Y., two 100 horse-power each; Marietta Electric Light Company, Marietta, Ga., one 25 horse-power; A. M. Young, Catskill, N. Y., two 100 horse-power each; Central Passenger Railway Company, Louisville, Ky., one 150 horse-power; Pioneer Iron Works, Cienfuegos, Cuba, 60 horse-power; Metropolitan Street Railway Company, Portland, 100 horse-power.

**The Thomson-Houston Electric Co.** make an excellent showing as will be seen from the following sales of apparatus:

Incandescent.—Bridgeport, Conn., 800; Portland, Me., 800; Excelsior Springs, Mo., 400; Phœnix, N. Y., 400; Beverly, Mass., 400; Northampton, Mass., 400; Lynn, Mass., 1,000; Lebanon, Tenn., 300; Piqua, O., 1,300; Fort Paine, Ala., 600; Meriden, Conn., 600; Covington, Conn., 600; Charles City, Iowa, 300; St. Paul, Minn., 300; Tarrytown, N. Y., 600; Wilmington, N. C., 600; Northampton, Mass., 600; Chattanooga, Tenn., 1,300; Cleveland, O., 1,300; Norwalk, Conn., 600; Tarentum, Pa., 600; Bridgton, N. Y., 600; Camden, N. J., 1,300; West Moorestown, N. Y. 500; Gardiner, Me., 500; Charlotte, N. C., 600; Forbes & Co., Portage, Wis., 600; Sawyer, Goodman & Co., Manonette, Wis., 200; Vermont Marbie Co., Proctor, Vt., 200; B. F. Keith, Philadelphia, Pa., 400; Wm. Gundy & Co., Bristol, Pa., 400; A. E. Bonkhart, Cincinnati, O., 900; Geo. E. Keith, Campello, Mass., 50; Julius Saul, Albany, N. Y., 75; Walter Aiken, Franklin Falls, N. H., 100; Spencer House, Niagara Falls, N. Y., 200; W. H. Burns & Co., Worcester, Mass., 150; B. F. Thomas, Columbus, O., 200; Baugh & Sons, Philadelphia, Pa., 250; Helvetius Silk Co., Paterson, N. J., 200.

Arc.—Lebanon, Tenn., 18; Wilmington, N. C., 25; Meridian, Miss., 75; Piqua, O., 35; Brunswick, Ga., 50; Paterson, N. J., 50; Tacoma, W. T., 50; Boston, Mass., 50; Columbus, O., 150; Spokane Falls, W. T., 50; St. Paul, Minn., 25; Brooklyn, N. Y., 90; Springfield, Mass., 270; Catskill, N. Y., 30; Lake Pleasant, Mass., 30; Dedham, Mass., 30; Charlotte, N. C., 50; Leominster, Mass., 50; Woburn, Mass., 100; Savannah, Ga., 150; Birmingham, Ala., 50; E. S. Trussel, Pomeroy, O., 25; Providence Steam Eng. Co., Providence, R. I., 30; R. H. White & Co., Boston, Mass., 50; Kreamer Bros., Cincinnati, O., 50; Warsaw Milling Co., Warsaw, Ill., 35; W. Resor & Co. Cincinnati, O., 150.

ISOLATED.

Incandescent.—Haile & Frost Mfg. Co., Hinsdale, N. H., 100; W. H. Burns & Co., Worcester, Mass., 250; Graton & Knight Mfg. Co., Worcester, Mass., 200; Chas. Van Benthuysen, Albany, N. Y., 300; Wm. Underwood, Boston, Mass., 200; N. Y. Life Ins. Co., New York, N. Y., 400; Metropolitan Rubber Co., Wallingford, Ct., 400; Wainwright Mfg. Co., Medford, Mass., 200; Russel Counter Co., Woburn, Mass., 75.

Arc.—Howland & Ellis, Boston, Mass., 3.

### Nervous Action and Electric Phenomena.

M. de Tarchanoff has just discovered that all nervous action that takes place in the human organism is accompanied by electric phenomena of the skin and with electric discharges that move the glands of the skin. For instance, the solution of problems of mental arithmetic give birth to electric currents from the skin which correspond in intensity to the difficulty of the intellectual labor.

It is not possible to satisfactorily explain this curious fact. But it may now be accepted as certain that every intellectual act becomes the source of an increase of heat and of different productions coming from the wear of the brain, which have to be eliminated from the system.

The glands of the skin that secrete the perspiration act as safety valves for these phosphoric and electric elements that are set free in the human system by the action of the brain when thinking.

This discovery is of the highest importance and it is easy to see what practical benefits medical science will be enabled to derive from it. In the first place its use in alleviating diseases caused by overworking the brain can scarcely be exaggerated. Then again it shows the importance for men who have great intellectual work to do to keep the skin in a perfectly healthy state. It is understood that a number of electrical machines have been invented by a prominent New York physician and exhibted at Pittsburgh, Pa., adapted to the treatment of throat and nasal diseases and the removal of tumors by cauterization, instead of the use of a knife.

It is learned that the invention has been highly endorsed by Dr. Lippincott and other physicians, and it is thought the application of static electricity will revolutionize many practices in medicine and surgery.

The experiments which have been made are said to have been highly satisfactory.—*New York Herald.*

### Carbon Setters Strike Ended.

The strike of the carbon setters and linemen in the employ of the Allegheny County Light Company is virtually settled. This was the result of a conference between H. H. Westinghouse, Secretary Blaxter, Secretary Martin and President Smith, of the A. F. G. W. U. The former gentlemen represented the company and the latter the American Federation of Labor.

**Portsmouth, O.**—The Portsmouth Gas and Electric Company has organized with a capital stock of $100,000.

**Boston, Mass.**—The Bridgewater Electric Company has been incorporated with a capital of $15,000. Ferdinand A. Wyman is president and Arthur S. Palfrey, treasurer, and these, with Phœbus H. Alexander, constitute a majority of the directors.

**Portland, Me.**—The Wyner-Hoch Electric Company, of Portland; capital stock, $1,000,000; paid in $250; par value shares $50. President, Chauncey M. Rawson, Newton, Mass.; treasurer, Geo. E. Frye, Boston, Mass; directors, Chauncey M. Rawson, Frederick J. Allison, George E. Frye, Julius Koch and Ernest W. Buck.

**Stonington, Conn.**—The Boston Electric Light and Gas Company has purchased the charter obtained from the legislature, and have signed a contract to illuminate the village of Mystic Bridge. The contract calls for the lighting of the streets and residences before Dec. 1. Probably both electric and gas lights will be introduced.

**New York City.**—The International Graphophone Company, with a capital of $5,000,000, has been incorporated, "to sell and use all inventions relating to the recording or reproducing of speech and musical sounds." The incorporators are George Hyatt, Charles C. Howard, Patrick F. Vaughan, Edward D. Phillips, William H. Richter, Frederick Strauss, Edward Kavanagh, John A. Snyder, Frederick W. Schramm, Albert Stern and Henry E. Kavanagh.

**FOR SALE.**—Machine Shop and Foundry, in the City of Big Rapids. 7,000 population; also an electric light plant of 40 arc lights. Best Water Power in the State. Business prosperous and well established. Reason for selling is that the estate must be settled up. For particulars address

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BIG RAPIDS, MICH.

## SEALED PROPOSALS.

**RESOLVED,** That the city clerk of the city of Council Bluffs, Iowa, be instructed to advertise for sealed bids to be received at his office until noon of the 16th day of September, 1889, for lighting the streets of said city for the terms of one, two, three, four and five years, with electric arc lights, 2,000 candle power, on towers and low arc lights on poles, with incandescent electric lights of 16 or 32 candle power on poles or posts, with gas of five foot burner power on posts, and gasoline of 16 candle power on posts, said lights to be turned on or lighted at early twilight, and to furnish light all night, or light to be furnished according to the Philadelphia schedule.

Each bid must be accompanied by a bond in the sum of $1,000, signed by one resident and approved surety, or in lieu thereof a certified check for a like amount, made payable to the city of Council Bluffs, Iowa.

The right is reserved by the city to reject any or all bids.

Any information desired will be furnished by the city clerk.

Passed August 5, 1889.

M. H. HUNTINGTON,
City Clerk.

Approved August 9, 1889.

R. F. ROHRER,
Mayor.

## ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING AUGUST 27, 1889.

409,689 Lightning arrester; Herman Lemp, Lynn, Mass.

409,736 Telephone receiving investment; Robert D'Unger, Chicago, Ill.

409,738 Coin-operated induction coil; John Elfering, Chicago, Ill.

409,756 Electric railway crossing. 409,757 Underground conduit for electric railways; Elias E. Reis, Baltimore, Md., assignor to Reis and Henderson, same place.

409,775 Electric railway; Sebastian Z. De Ferranti, Hampstead, England.

409,815 Electrically-propelled vehicle; Richard N. Allen, Cleveland, O.

409,852 Bracket for electric lamps; J. S. Merrill, Columbus, O.

409,891 Electric recording gauge; Jos. Wills, Nashville, Tenn.

409,926 Cable or electric street railway; Lewis M. Clement, Oakland, and Geo. C. Wattrins, San Francisco, Cal.

410,007 Secondary battery electrode; James F. McLoughlin, Philadelphia, Pa.

410,013 Electric pendulum clock; Albert L. Parcelle, New York, N. Y.

410,037 Electrode for secondary batteries; F. H. Smith, Baltimore, Md.

410,111 Apparatus for charging secondary batteries; William P. Kookogey, Brooklyn, N. Y., assignor to the Kookogey Electric Company, New York City.

410,136 Electrode for secondary batteries; Chas. H. Carter, Brooklyn, N. Y.

**FOR SALE.**—Two Z 55 Volt Edison Dynamos, 1 Resistance Box, 250 Lamp Sockets, besides Chandeliers, Lamp Posts and other attachments. All in first-class order; will be sold at a sacrifice, having no use for the above articles. Call or address,

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Suits are now pending in the U. S. Circuit Courts against infringers of the Bogart Patents in the cities of New York, Philadelphia and Boston.

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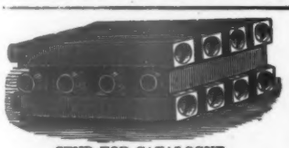

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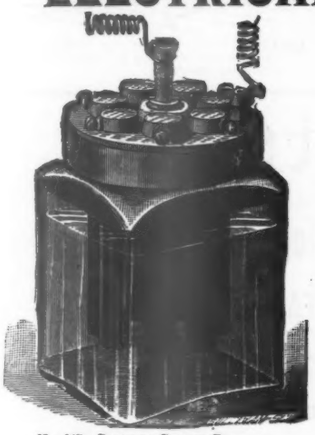

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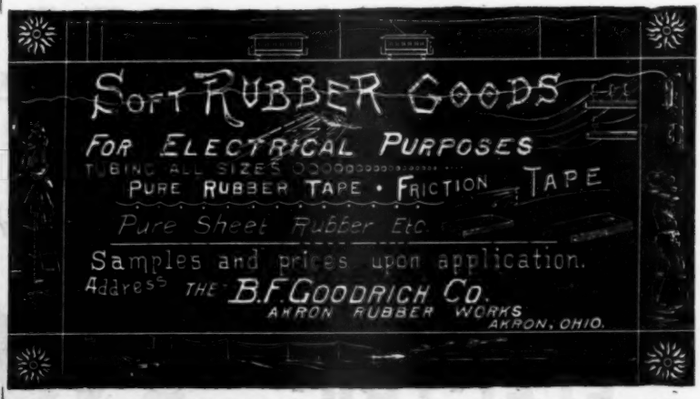


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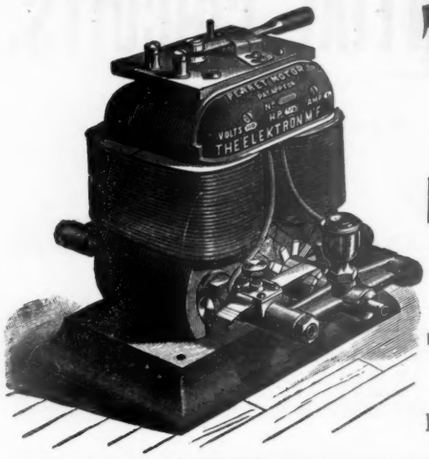


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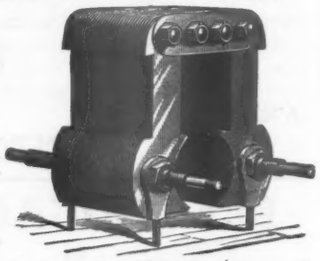

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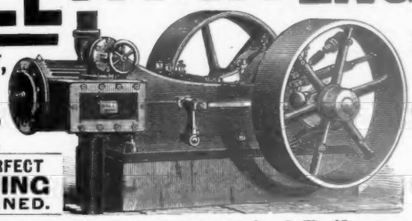

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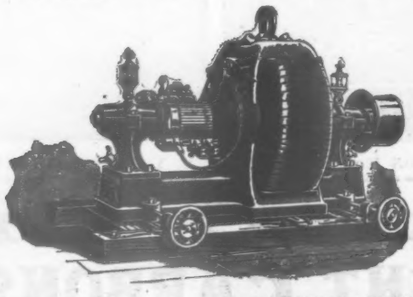

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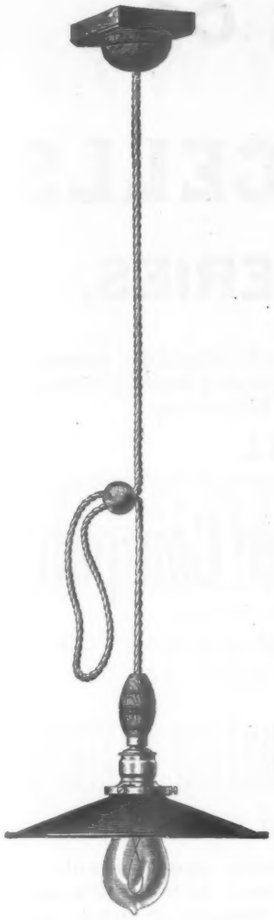

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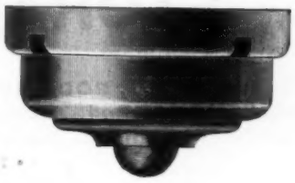

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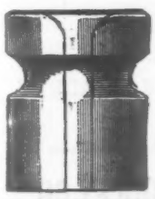

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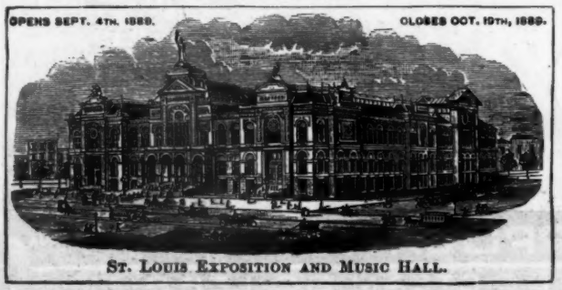


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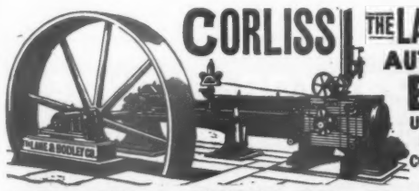


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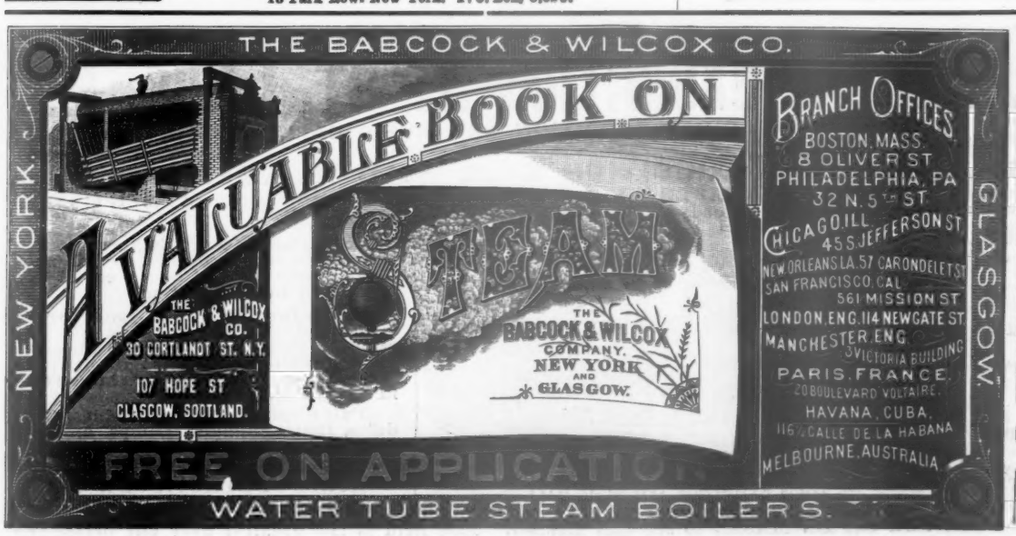
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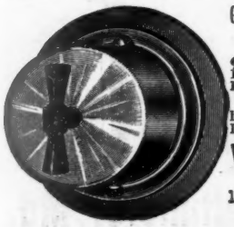

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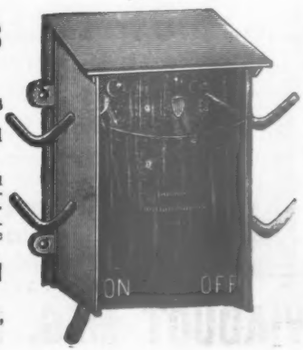


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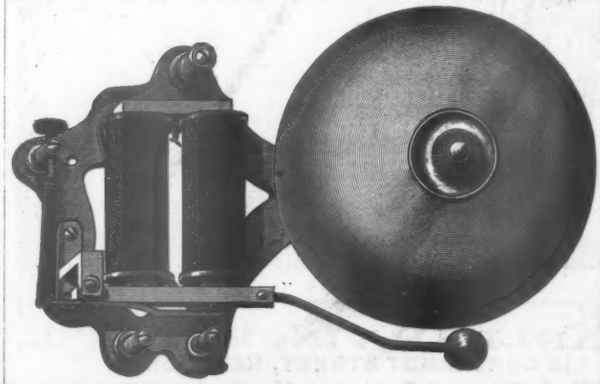

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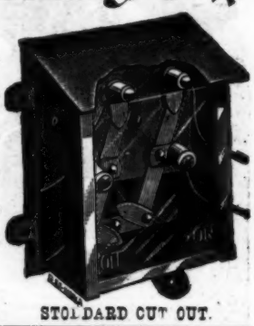

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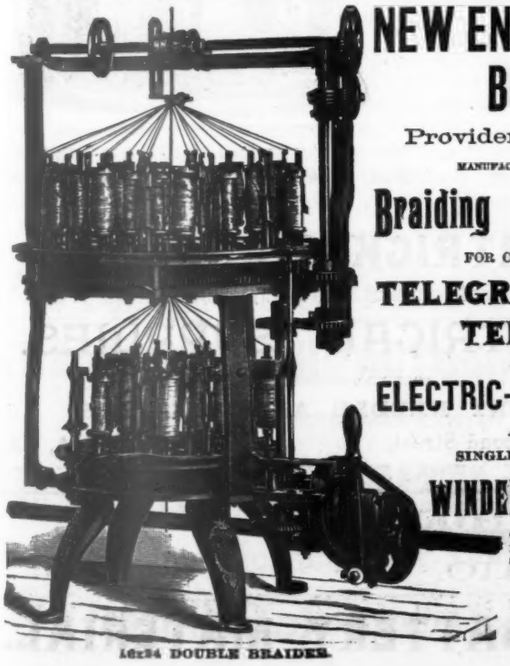

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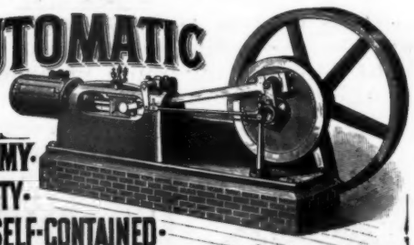

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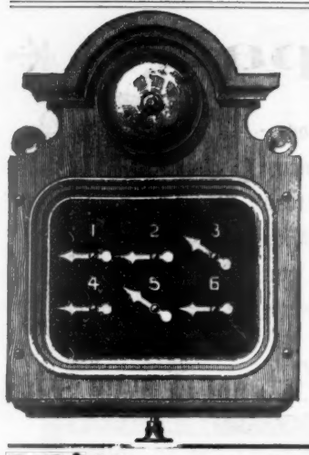

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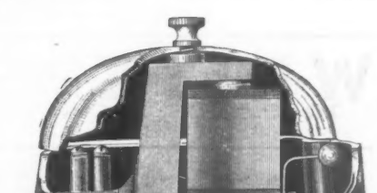

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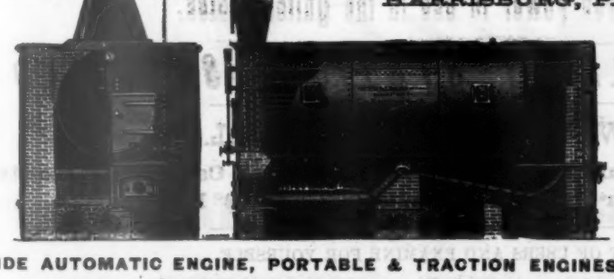

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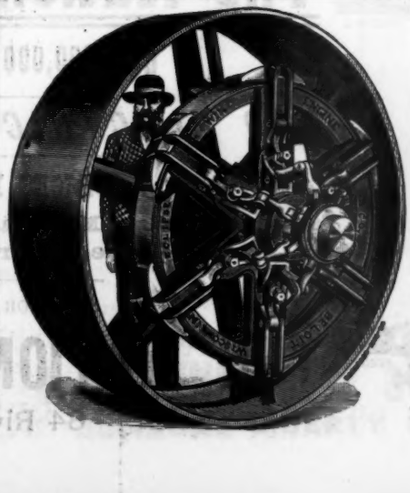

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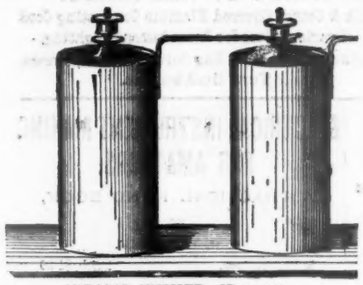

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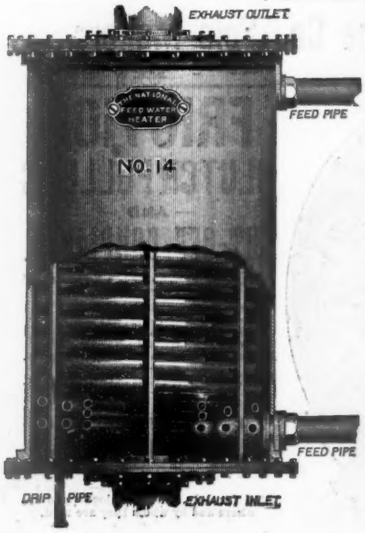


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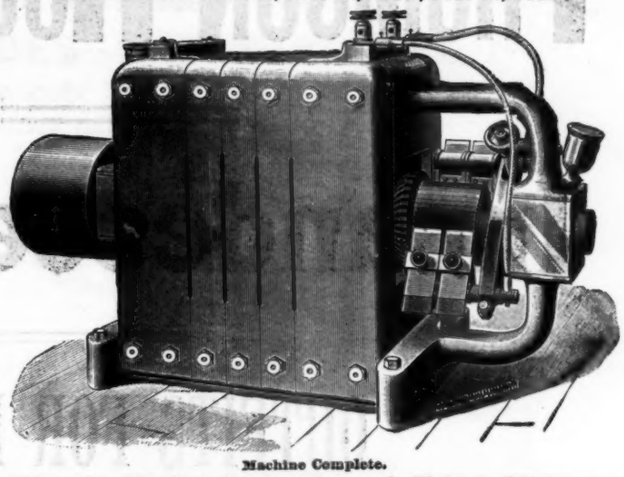

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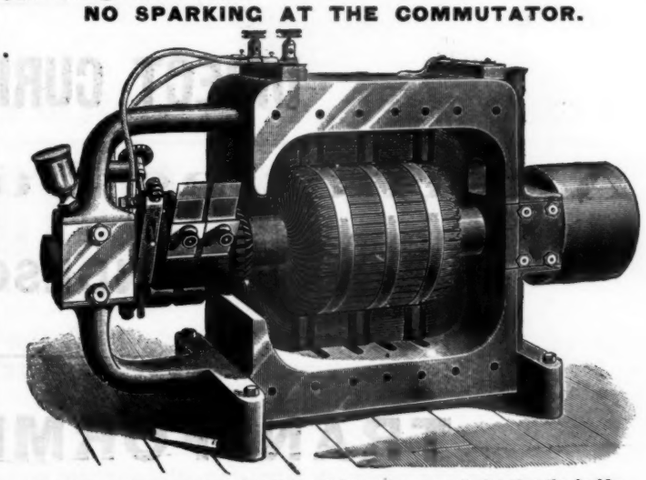

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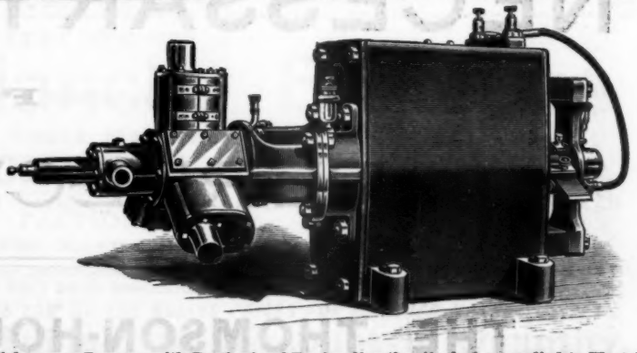

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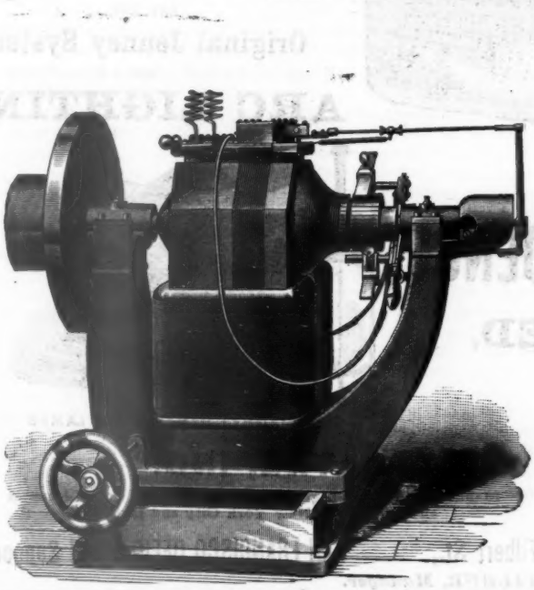

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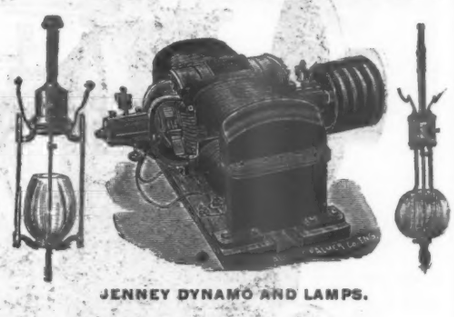

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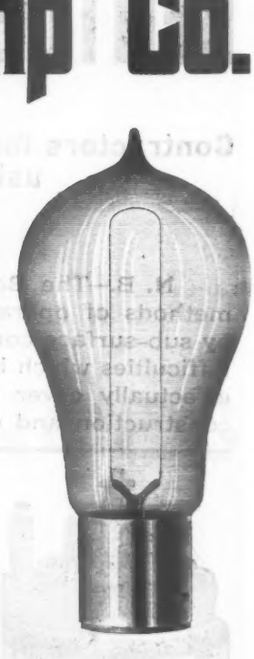

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